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The Quarterly Journal of the Royal Economic Society

No. 275 **SEPTEMBER 1959** **Vol. LXIX**

I. *Articles*

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Income Originating in the Models of Domar and Harrod	H. T. OSHIMA
Domar and Dynamic Economics	SIR ROY HARROD
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ADAM SMITH'S *MORAL SENTIMENTS* AS FOUNDATION FOR HIS *WEALTH OF NATIONS*

By A. L. MACFIE

I

THE year 1959 marks the second centenary of Adam Smith's *Theory of Moral Sentiments*. This work, though highly esteemed in his day, has since been eclipsed by its mighty successor, to such an extent that it has tended to be regarded as an early rather academic exercise, in some respects difficult to reconcile with the more experienced work. An anniversary seems a proper time to reconsider the connexion between the two works as indicated by their actual contents.

Today we should expect the link between a book on Ethics and one on Economics to be found in utility. But here this is not so. For in neither book does Utilitarianism or utility play an important part. How far Adam Smith believed in Utilitarianism as an ethical creed is a subject for separate ethical treatment. Enough to show that its influence on the *Moral Sentiments* was sufficiently minor to prove that this theory had no explicit influence on the *Wealth of Nations*, and we can content ourselves with giving some Smithian arguments to show that this was so. This indeed is not surprising when one remembers what slight treatment utility gets in the economic work as a basis of value theory. One of Smith's most inadequately balanced statements is surely the notorious sentence: 'The things that have the greatest value in use have frequently little or no value in exchange; and, on the contrary, those which have the greatest value in exchange have frequently little or no value in use.' The hoary examples are equally tendentious. A damaging neglect of demand theory inevitably resulted.

In the *Moral Sentiments*, however, Smith was obliged to consider Utilitarian ethics, and he does so explicitly in his criticism of Hume's utility theory. That 'ingenious and agreeable philosopher' had held that we approve of an object's utility simply because of the pleasure we know or believe it yields. Utility corresponds to pleasant consequences. Smith comments on this: 'It is not the view of this utility or hurtfulness which is either the first or principal source of our approbation or disapprobation. . . . For first of all, it seems improbable that the approbation of virtue should be a sentiment of the same kind as that by which we approve a convenient or well-contrived building; or that we should have no other reason for praising a man than that for which we commend a chest of

drawers.'[1] Then again, 'The sentiment of approbation always involves in it a sense of propriety quite distinct from the sense of utility.' The proper estimate of this 'sense of propriety' he indeed claims as his own invention: 'That this fitness, this happy contrivance of any production of art should often be more valued than the very end for which it is intended; and that the exact adjustment of the means for obtaining any conveniency or pleasure should frequently be more regarded than that very conveniency or pleasure, in the attainment of which their whole merit would seem to subsist, has not, so far as I know, been taken notice of by any body. That this is however very frequently the case, may be observed in a thousand instances, both in the frivolous and in the most important concerns of human life.'[2] He goes on to define his theory more positively by equating the sense of propriety to 'beauty', the beauty of the 'well-contrived machine', such as provides 'a thousand agreeable effects', whereas a rusty, jarring machine would be 'necessarily offensive'. Utility then is no more than a means, or mediate good; and this we can accept as sufficient basis for economic science. We need not therefore describe Adam Smith's positive ethical position. Suffice it to say that in the *Moral Sentiments* the position is eclectic, with a distinct bias towards the modified Stoicism typical of Cicero, and almost conventional in the Enlightenment. His account of the different 'systems of virtue' concludes: 'The only difference between it ("that theory which places virtue in utility") and that which I have been endeavouring to establish is, that it makes utility and not sympathy or the correspondent affection of the spectator the natural and original measure of this proper degree ("of all the affections").'[3] Clearly, Adam Smith was not trying to establish the ethical primacy of utility.

This becomes even more specific in his treatment of the 'pleasures of wealth and greatness', in which the economist might surely expect to find utility recognized as the source of economic endeavour. Yet, in the crucial passage in the *Moral Sentiments*, utility is not mentioned as a motive. What we find is this: 'The pleasures of wealth and greatness . . . strike the imagination as something grand and beautiful and noble, of which the attainment is well worth the toil and anxiety which we are so apt to bestow on them.' This, however, he at once dubs a 'deception', though it remains the force 'which rouses and keeps in continual motion the industry of mankind'. For here we confront the 'capacity of the ("proud and unfeeling landlord's") stomach' which 'bears no proportion to the immensity of his

[1] *Moral Sentiments*, pt. iv, ch. ii. In the sequel, *M.S.* will stand in the footnotes for the *Theory of Moral Sentiments*, and *W.N.* for the *Wealth of Nations*. The editions referred to are Alex. Murray's (1872) reprint of the *Essays of Adam Smith* for the *Moral Sentiments*, and to the Everyman edition for the *Wealth of Nations*.

[2] *M.S.*, pt. iv, ch. i, pp. 158–9.

[3] Ibid., pt. vii, sect. ii, ch. iii, p. 271.

desires'.[1] Hence the rich 'consume little more than the poor, and in spite of their natural selfishness and rapacity . . . they divide with the poor the produce of all their improvements'; 'so they are led by an invisible hand . . . without intending it, without knowing it, to advance the interest of society, and afford means to the multiplication of the species'.[1]

This 'deception' theory, which is here part of the *ethical* theory of the *Moral Sentiments*, is a tricky one. If we look at the 'pleasures of wealth and greatness' alone, in isolation, it then appears that they are vain. They deceive us. Indeed, 'in ease of body and peace of mind, all the different ranks of life are nearly upon a level, and the beggar who suns himself by the side of the highway possesses that security which kings are fighting for'.[1] On this score, taken alone, then, the more satisfying aims for individuals should be 'security, ease of body, peace of mind', as against 'the palaces and economy of the great'. But in fact this is not the whole story. We have also to think of the 'beauty of the arrangement', 'the order, the regularity and harmonious movement of the *system*'. It is here that the 'deception' finds its justification. For in the system, the 'deception' is seen as necessary 'to raise and keep in motion the industry of mankind'. It is the dynamo of progress, necessary if the multiplying people are to be fed. So the 'pleasures of wealth and greatness' are at once not 'the real happiness of life', as contrasted with 'the real satisfaction which these things are capable of affording', and they are also a 'deception', 'contemptible and trifling', if we accept them as in any sense real or final. But we realize their true function if we climb to a higher, almost metaphysical level. For there we see their true usefulness in the purposes of the invisible hand, which in its benevolence 'advances the interests of society'. These 'deceptive pleasures' find their justification or utility in the beauty of the system.[2]

This doctrine of luxury spending has of course an important place in early economic theory, where it supplies much of the force we today ascribe to 'investment'. What is here important is the fact that this theory, and the almost theological view of the invisible hand behind it, are exactly carried over from the *Moral Sentiments* into the *Wealth of Nations*. Certainly, there, as seems proper, the ethical overtones are damped down. The 'deception' becomes 'an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it',[3] in respect of efficiency. The individual motive itself becomes 'the uniform, constant and uninterrupted effort of every man to better his condition'[4] (surely in no sense a 'deception'). So the analysis is now properly pushed no further

[1] Ibid., pt. iv, ch. i, pp. 162–3.

[2] Utility for Smith, as for Hutcheson, was utility for it. In this way it differs from self-interest and partakes in beauty and fitness: in this sense only, the 'deception' has utility.

[3] *W.N.*, vol. i, p. 400. [4] Ibid., p. 306.

than the economic level. But the invisible hand here remains to control the individual conflicts and excesses of competition, and to safeguard the public good through healthy competition. Such is his faith.

Utility is also considered by Smith in its social reference, as usefulness to the 'great machine'. The inadequacy of this as general social theory will be considered later. Here we may note an explicit statement on the adequacy of utility as a social bond. 'Society', he says, 'may subsist among different men, as among different merchants, from a sense of its utility, without any mutual love or affection.' But it cannot subsist among those who are at all times ready to hurt and injure one another. So prior to utility must come justice. 'Justice . . . is the main pillar that upholds the whole edifice.'[1] For benevolence cannot be forced, whereas utility *depends* on justice being enforced. So utility can never dispense with justice, though the opposite can hold. We see the utility to society of the death penalty for a sleeping sentry—'an unfortunate victim who indeed must, and ought to be devoted to the safety of numbers'.[2] But the final sanction is 'the justice of God'. 'Our sense of the ill-desert [of injustice] pursues it, if I may say so, even beyond the grave, though the example of its punishment there cannot serve to deter the rest of mankind.'[3] What then is the essential social cement? An early description is this: 'Man, it has been said, has a natural love of society . . .: the orderly and flourishing state of society is agreeable to him, and he takes delight in contemplating it.'[4] The specific social bond is here for Smith a felt one. It is sympathy, one of the seminal sources in the *Moral Sentiments*, to which we must next turn.

II

Sympathy is important because an economic theory must be based on some assumptions as to the social bond, and for Smith sympathy was the effective cement of society. The *Moral Sentiments* in fact begins on this note—that sympathy is an emotion. 'Pity and compassion are words appropriated to signify our fellow-feeling with the sorrows of others. Sympathy, though its meaning was perhaps originally the same, may now, however, without much impropriety, be made use of to denote our fellow-feeling with *any passion whatever*.'[5] Sympathy is therefore essentially fellow-feeling, a feeling for others through 'putting ourselves in their situation', a 'very illusion of the imagination'.[5] Smith therefore at once attacks 'those who are fond of deducing all our sentiments from certain requirements of self-love'.[5] For that sympathy is in no way selfish he constantly insists. The clearest argument is perhaps that near the end of

[1] *M.S.*, pt. ii, sect. ii, ch. iii, p. 79. [2] Ibid., p. 83. [3] Ibid., p. 84.
[4] Ibid., p. 80. [5] Ibid., pt. i, sect. i, chs. i, ii, p. 13—italics mine.

the book, where he deals with 'those authors who deduce from self-love the interest which we take in the welfare of society'.[1] Discussing the 'virtue of Cato' and the 'villainy of Cataline', he insists that 'Sympathy cannot in any sense be regarded as a selfish principle.' 'The idea, in short, which those authors were groping about, but which they were never able to unfold distinctly, was that *indirect sympathy* which we feel with the gratitude or resentment of those who received the benefit or suffered the damage resulting from such opposite characters.'[1] Indeed, when I imagine your distress, I do not merely imagine what I should suffer if I were really in your position. 'I consider what I should suffer if I were *really you*. . . . My grief is therefore entirely upon your account, and not in the least upon my own.' So he moves to the characteristic conclusion: 'A man may sympathize with a woman in child-bed, though it is impossible that he should conceive himself as suffering her pains in his own proper person.'[2]

Sympathy is then an emotion, and an unselfish emotion. To the modern mind, however, this does not appear sufficient to establish it as the cement of actual societies. Though it might so instinctively bind a flock of sheep, it could hardly create the wealth of concrete social activities and institutions which for us constitute societies. Here, the most reasonable view, on his written word, seems to be that while Smith realized that sympathy was not enough, he was not in fact able to transmute it into a specific theory of social life. He did show that he understood *how* sympathy alone was not enough, for, in effect, though not in consciously offered theory, he did trace how *rational* sympathy (including *proper* self-regard) produced the effective actual institutions of society. But his *explicit* description of society was held in detachment from this inductive line of thought. This explicit view was that common in the eighteenth century, and handed down from the seventeenth (and indeed from the Stoics) that society was a 'great machine', with God as the 'All-wise Architect and Conductor'.[3] This uncriticized dogma successfully prevented him from working out a more adequate explicit theory. On the inductive side, however, especially in the *Wealth of Nations* there is ample detail to show how he might have grown to such a theory in a more favourable climate, if he had worked out his ideas as to how social sympathy actually develops in real societies. The most important of these we must now trace.

First, then, Smith insists that we must *approve* of the 'affection from which the action proceeds' when we sympathize: we must 'regard the person towards whom it is directed, as its proper and suitable object'. Now, 'approval', judgements of what is appropriate, cannot be made by

[1] *M.S.*, pt. vii, sect. iii, ch. i, p. 281—italics mine.
[2] Ibid.—italics mine.
[3] Ibid., sect. ii, ch. i, p. 255, and pt. vii, sect. iii, ch. iii, p. 290.

mere emotion. They are bound to be rational.[1] Our sense of propriety reflects Smith's constant emphasis on the 'fitting' as one essential in the good. But the fitting can be described only by reason and in relation to a situation. Smith himself makes this general point. 'Our moral faculties are by no means, as some have pretended, upon a level in this respect with the other faculties and appetites of our nature. . . . No other faculty or principle judges of any other.'[2] 'Any' is the vital word. And that this judgement occurs in the form of reason appears in these further quotations. We have already noted how he defines 'virtue'. Here, he describes 'sympathy or the *correspondent* affection of the spectator' as 'the natural and original measure of (the) proper degree of all the affections'[3] in which virtue consists. Here we need merely insist that the idea of the 'spectator' *adds* something—something more than the 'affection' alone. The further essence or facet is in fact judgement, and Smith's constant 'impartial' in his regular phrasing emphasized just this. Without sympathy, reason may be inhuman and powerless. But without the 'impartial spectator', without reasoning judgement, sympathy is dumb. It is therefore unfruitful; it alone could not search out the 'many inventions' of social institutions or of justice or economy.[4] Alone, it could merely feel. The practical act,

[1] Here, however, different interpretations can be taken. Quotations showing that Smith stressed the objective side of approval are given later. But it should here be noted that he continually refers to approval and disapproval as *feelings*, and therefore presumably subjective. This leads to a totally different view of the *Moral Sentiments*. A clear exposition of it will be found in *Polity and Economy: an Interpretation of the Principles of Adam Smith* (1957), by Joseph Cropsey. This stimulating work advocates the consistency of Smith's two major works, as is done here, but on different grounds. Dr. Cropsey traces the mechanical psychological 'passions' or 'Motions' as the controlling force behind human motivation in the *Moral Sentiments* and from this he logically deduces a line of economic determinism in the *Wealth of Nations*—as Marx himself did. This mechanical psychology is certainly common in the eighteenth century, and Dr. Cropsey's argument is at least a sound corrective to any undue softening of the hard-headed Smithian outlook. But the opposing theory based on sympathy and the impartial spectator is at least as prevalent throughout the *Moral Sentiments*. Criticism supporting the latter view will be found in L. Bagolini, 'La Simpatia nella Morale e nel Diretto', J. N. Prior, 'Logic and the Basis of Ethics', and J. N. Findlay, 'Values in Speaking' (*Philosophy*, vol. 25).

[2] *M.S.*, pt. iii, ch. v, p. 145.

[3] Ibid., pt. vii, sect. iii, ch. iv, p. 271—my italics.

[4] Here are some quotations to illustrate this fundamental Smithian idea. 'We endeavour to examine our own conduct as we imagine any fair and impartial spectator would examine it. If upon placing ourselves in his situation, we thoroughly enter into all the passions and motives which influenced it, we approve of it, by sympathy with the approbation of this supposed equitable judge' (ibid., pt. iii, ch. i, p. 101). Or again, stating the rational side, 'Bring a man into society, and he is immediately provided with the mirror he wanted before.' But the mirror is never passive. 'When I endeavour to examine my own conduct . . . I divide myself into two persons. . . . The first is the judge, the second the person judged of' (ibid.). The essence of this is mediate judgement, the 'impartial spectator's' judgement being the 'correspondent' rational aspect of sympathy. Similarly, 'It is not the soft power of humanity, it is not that feeble spark of benevolence which Nature has lighted up in the human heart, that is thus capable of counteracting the strongest impulses of self-love. It is a stronger power. . . . . It is reason, principle, conscience, the inhabitant of the breast, the man within, the great judge and arbiter of our conduct. . . . The natural misrepresentation

like the act of artistic creation, is a complex unity. Feeling and thought, like colour and form, are aspects of this unity. To suggest that we can finally separate them, or explain the act by any one alone, is the major (and constant) error that the merely analytic intelligence commits. Smith's freedom from this type of intellectual aridity is possibly his greatest asset. It is the source of his realism—how, we must next consider.[1]

The way in which sympathy acts to create social opportunities, duties, and institutions works through its social reflection in public opinion. Thus, through its reasoning side, it establishes a proper code of social behaviour. Referring to resentment or revenge, Smith says: 'There is no passion, of which the human mind is capable, concerning whose justness we ought to be so doubtful, concerning whose indulgence we ought so carefully to consult our natural sense of propriety, or so diligently to consider what will be the sentiments of the cool and impartial spectator.'[2] Again, 'Magnanimity, or a regard to maintain our own rank and dignity in society, is the only motive which can ennoble the expressions of this disagreeable passion. This motive must characterize our whole style and deportment.'[2]

One passage which expresses this important realization of the formation through social experience of standards and institutions, 'the general laws of morality', appears in the chapter 'Of the Nature of Self-deceit, and the Origin and Use of General Rules' (pt. iii, ch. iv). 'Nature', he says, 'has not abandoned us entirely to the delusions of Self-love. Our continual observations upon the conduct of others, insensibly lead us to form to ourselves certain general rules concerning what is fit and proper either to be done or to be avoided.'[3] In this way social customs influence us through the 'impartial spectator' the 'man within the breast', and the 'self-deceit' which causes 'the partial views of mankind with regard to the propriety of their own conduct' is overcome. On this there follows a passage which surely must have inspired Burns's

> O wad some Pow'r the giftie gie us
> To see oursels as others see us!

(For Burns treasured his copy of the *Moral Sentiments*.) Smith's prosaic version is 'If we saw ourselves in the light in which others see us, or in which they would see us if they knew all, a reformation would generally

can be corrected only by the eye of this impartial spectator. . . .' (ibid., ch. iii, p. 120). Again, criticizing the view that we have an internal intuitive or 'moral sense' which pronounces actions right or wrong, he insists that it is through experience in social life, and with reference to social rules that we form these judgements.

[1] The artist Braque suggests an analogy to the relation between Smith's sympathy and the impartial spectator, when he writes: 'Colour and form make their effect simultaneously, though they have nothing to do with each other.' (Quoted in Dora Vallier, 'Braque, La Peinture et Nous', in *Cahiers d'Art*, 1954.)

[2] *M.S.*, pt. i, sect. ii, ch. iii, p. 36.

[3] Ibid. The passages in this paragraph occur at pt. iii, ch. iv, p. 139.

be unavoidable.' It is submitted these passages prove conclusively that for Smith the approval of what is at least useful, what is appropriate, what probably is good or virtuous, takes place through the faulty and gradual operation of individual consciences guided and formed by social experience and institutions on particular issues. As well as being emotional, as is sympathy, as well as being intuitive, as would be a moral sense, it must be rational, and so guided by rationalized social rules. At least, we listen to public opinion: 'We hear everybody about us express the like detestation against (some actions of others which shock all our natural sentiments).' Of course, a highly important development of these social institutions takes place in economic life; and in dealing with the 'prudent man' of the *Moral Sentiments*, I shall later quote the explicit reference to 'oeconomy' in the earlier book. This is indeed the moral basis on which he founds his economic man theory in the *Wealth of Nations*.

III

The special fact that this essay seeks to establish will now be clear. It is that while sympathy is the essential social sentiment for Smith as for Hume (who coupled it with utility), for Smith sympathy is always *united with reason*, with the operation of the impartial spectator; and that, on a broad estimate, it seems true to say that Smith specially stressed the rational rather than the emotional side. Reason links the emotion with impartiality or conscience. Feeling will not make you 'well-informed' or 'impartial'. Only reason can do that—the practical reason.[1]

Here we meet a modern difficulty in the interpretation of Smith. Today we tend to *analyse* propositions. It was Smith's special genius to

[1] The fact that for Smith sympathy and reason were two facets of the one activity is specially obvious in this summary statement: 'Whatever judgement we can form concerning (our sentiments and motives) . . . must always bear some secret reference, either to what are, or to what on a certain condition, would be, or to what, we imagine, ought to be the judgement of others. We endeavour to imagine our conduct as we imagine any other fair and impartial spectator would examine it. If, upon placing ourselves in his situation, we thoroughly enter into all the passions and motives which influenced it, we approve of it, by sympathy with the approbation of this supposed equitable judge' (*M.S.*, pt. iii, ch. i, p. 100). Again, concluding his estimates of the 'ancient' and 'some modern systems' according to which virtue consists in various forms of propriety or 'acting according to the truth of things', or in 'that of my Lord Shaftesbury . . . maintaining a proper balance of the affections', he concludes: 'None of these systems either give, or even pretend to give, any precise or distinct measure by which this fitness or propriety of affection can be ascertained or judged of. That precise and distinct measure can be found nowhere but in the *sympathetic feelings of the impartial and well-informed spectator*' (ibid., pt. vii, sect. ii, ch. i, p. 259. My italics).

Reference may here be made to two learned American writers, whose so scholarly appreciations themselves underline the tendency to underestimate the 'impartial spectator', the rational element. They are Dr. O. H. Taylor in his *Economics and Liberalism*, pp. 70 et seq., and Glenn R. Morrow in *Adam Smith 1776–1926*. The emphasis of both is strongly on the emotional side of sympathy, e.g. in the development of justice. But sympathetic feelings alone could not build systems of law; justice also needs brains; the impartial judge is the architect of just institutions.

hold together different propositions under one formula which he used to explain social life. We, when we see 'sympathy' and 'impartial spectator' linked together, tend to stress the difference between the ideas and their functions. Adam Smith, on the contrary, saw them as two aspects of one practical working function which emerged in practical judgements based on experience. I am not contending that Smith's method is better than analytic procedures, far less that it is faultless. Consistency was not his shining virtue. The contention merely is one of fact—this is what Smith's method was. The rational element in his argument needs special stress, because without it we fail to see the link between our social feelings and the actual growth of judicial and economic systems. When we consider the relevance of the 'prudent' man, who in the *Wealth of Nations* appears as Mill's 'economic man', we shall see that Smith did give the prudent man a *rational* place in his system of the moral sentiments, and we shall realize that only reason could reveal and define this place. If so, it would indeed be in his emphasis on the 'impartial' that Smith's originality in ethics would consist. Hume had worked out the social functions of sympathy, as had other eighteenth-century thinkers. The 'impartial spectator', as Smith used it, is all his own. Smith wishes a more positive role for reason, as the builder of social institutions. If, then, Hume lit the destructive spark which helped to inspire the Kantian reconstruction, Smith may well have contrived in his 'impartial spectator' the revealing light which led to the *Critique of Practical Reason*.[1]

It may be useful here to collect the various ideas which, pieced together, go to show the kind of social theory that Adam Smith might have evolved had the thought and facts of his times been propitious to such a theory. Such a selection introduces the risk of bias; but I think it will be agreed that the theory and politics of the eighteenth century did not permit of an explicit theory of *society* as in some sense a *living human organism*, such as today we require as a minimum. The explicit theories of the seventeenth and eighteenth centuries from Hobbes to Bentham and his school are based on the natural rights of the *individual*; but these theories are political rather than social, legalistic rather than biological or evolutionary. Smith inevitably accepts this background. Explicitly he also repeats the mechanistic social theory of the seventeenth century. This is the view that human society is an 'immense machine'. 'Human society, when we contemplate it in a certain abstract and philosophical light, appears like a great, an immense machine, whose regular and harmonious movements produce a thousand agreeable effects.'[2] This view is linked with his

[1] The possible connexion between Adam Smith and Kant has frequently been noted, especially by German commentators. A. Oncken, for instance, produced *A. Smith and I. Kant* (1877) and *Das A. Smith Problem* (1898), in the latter of which he suggests Smith as 'ein Vorläufer Kant's', in respect of the *Moral Sentiments*. [2] *M.S.*, pt. vii, sect. iii, ch. i, p. 280.

description of God as 'the all-wise Architect', the engineer with his hands on the controls of the 'whole machine of the world', again a seventeenth-century, almost Newtonian picture.

Now, I should not assert that this theological type of theory has no influence on Smith's practical thought about man in society. It has obvious influence through his doctrines of order and harmonious adjustments of individual interests by the 'invisible hand', where necessary. But I should assert that it supplies no more than a very general theological framework, which Smith in no way reconciled with his inductive approach. In contrast, we should recognize Smith's realization that any more or less mechanical view of harmony was simply inadequate to explain the process by which men in society develop their moral rules and economic practices in the actual world. This follows from the famous passage on 'the man of system' who

> is apt to be very wise in his own conceit, and is often so enamoured with the supposed beauty of his own ideal plan of government, that he cannot suffer the smallest deviation from any part of it. . . . He seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon a chess-board. He does not consider that the pieces upon the chess-board have no other principle of motion besides that which the hand impresses upon them; but that in the great chess-board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might choose to impress upon it. . . . Some general, and even systematical, idea of the perfection of policy and law may no doubt be necessary for directing the views of the statesman. But to insist upon establishing, and upon establishing all at once, and in spite of all opposition, everything which that idea may seem to require, must often be the highest degree of arrogance. It is to erect his own judgement into the supreme standard of right and wrong.[1]

Here we have at once the exposure of any claim by any man, or even 'legislature', to assume the functions relevant only to perfect wisdom, and the implied case for individual liberty as against such human tyrannies. It shows proper realization of human imperfection as well as of rich individual differences. It exposes the totalitarian. The system of the Great Artificer may be appropriate to God. It is *hubris* for any human body. The individual is no mere piece of machinery. At the practical level, the method and purpose of individuals living in society cannot be explained by merely mechanical or logical thinking. Yet Smith always looks at society in his inductive thinking from the angle of the individual.

If so, must we then conclude that Adam Smith did not have an adequate social *theory*? So far as this mechanical or theological line goes, I should say he had not. And so far as he followed the political theory of legalistic individual rights, clearly that theory must accept the constructive criticism of more recent times. But I should hold that there is also an *implicit* social

[1] *M.S.*, pt. vi, sect. ii, ch. ii, p. 207.

theory which develops through his treatment of sympathy and the impartial spectator, and that this in fact is the theory which directs and dominates all Smith's thought. It is not self-conscious; it is not offered or argued as a theory of society. It is rather reflected and inspired by the stream of his inductive thought about the nature of individual life in society. It appears in his views about justice; utility is not enough, as a social framework. Justice 'follows the culprit beyond the grave where utility to society is irrelevant'. More concretely, social conduct and theory must take account of public opinion; they therefore reflect 'the man of real constancy and firmness, the wise and just man who has been thoroughly bred in the great school of self-command, in the bustle and business of the world. . . . He has never dared to forget for one moment the judgement which the impartial spectator would pass upon his sentiments and conduct.'[1] Still more concretely, this inductive social theory is implied in the view of the impartial spectator as the growing-point of sympathy in human conduct, the constructive logical force through which human institutions are built. Sympathy is the emotion, reason the operative method of the social act, both expressed through individual persons. Such a view could stand as a fair representative of much modern social theory. And while in Smith's work it is merely the working leaven, as such a leaven it is the vital dynamic of his thought, explicit or no.

IV

Perhaps the acid test of this interpretation is to be found in Smith's theory of the individual. Did it permit of social harmony? Can it show how the individual can be mediated into an adequate social life? If not, the mere success in evolving institutions, customs, and rules will not be enough to justify the claim that it is a true *social* theory. It might merely support a robber society, or a generalized claim to self-interest, linking men through a rather narrow utilitarian social theory. And this, of course, is very usually the conclusion that has been drawn by those considering the economic man of the *Wealth of Nations* alone. It has indeed been argued that the theory of the economic man there is in direct conflict with that of the prudent man in the *Moral Sentiments*.[2] If this is so, then the *Wealth of Nations* has simply cut adrift from the ethical position of the *Moral Sentiments*. I shall argue that there seems to be no evidence for this unlikely view, certainly unlikely in such an integrated character as Smith. It might still, however, be the case that the doctrine of the prudent man in the *Moral Sentiments* does reflect a narrowly utilitarian position. Here

[1] Ibid., pt. iii, ch. iii, p. 127.

[2] L. Bagolini, op. cit., gives a useful bibliography of the two opposed views here—that Smith's two books are complementary, or in conflict—at pp. 95 et seq.

again, I shall answer that this is simply not so, because the doctrine of the prudent man is in fact there very carefully fitted into his theory of virtue, which includes his social theory, and which is certainly not a utilitarian theory. It is indeed just in social life and in the creation of good social customs that the individual, even when he does not fully intend this, finds his own 'propriety' and happiness.

First, then, as to the supposed conflict between the two books. I should agree that there would be conflict if the prudent man and the economic man were understood as merely seeking their own interest, and as against this there were no other theory of reconciliation than a supra-rational 'invisible hand' or 'great machine'—truly a *deus ex machina*. For then, on the rational level, a conflict would be potentially universal. But it has been the argument here that there is such a reconciling theory, one worked out on a purely inductive humane pragmatic level through examining the process by which the laws of justice and the institutions of economic life are developed. Within the treatment of the sympathetic and impartial spectator, Smith's treatment of the prudent man seems a crucial and telling example of the way in which he tried to cope with the main difficulty in all social theories, the obstinate selfishness of the individual. If this is to be done convincingly, one must take the individual in all his narrowness, and show how his limited view of his own interest, and even his freedom to act harmfully, can work to the net benefit of society. This, it is argued, is just what can be done if we follow our texts and accept the view of sympathetic impartiality described.[1] Once again, the evidence has to be pieced together. For, just because his explicit theory of society was inadequate, Smith did not reach a satisfactory theory of the individual in society. But we have a clear argument as to the prudent man's service to society in the *Moral Sentiments*, and also for the economic man in the *Wealth of Nations*.

The argument arises in the *Moral Sentiments* in the interesting *progressive* analysis of 'vanity' and 'pride', of prudence and self-love, and of the self-interest of the *Wealth of Nations*. As to vanity, we should note how fundamental a determinant of human action it seemed to Smith. Two from the many possible quotations must suffice. 'From whence then', he asks, 'arises that emulation which runs through all the different ranks of men, and what are the advantages we propose by the great purpose of human life which we call *bettering our condition*?[2] To be observed, to be attended to, to be taken notice of with sympathy, complacency and approbation, are all the advantages which we can propose to derive from it. It is

[1] I am not of course suggesting that the impartial spectator—or public opinion at its best even—are always right; obviously they are not. But this is the way in which societies rub along, and, we hope, slowly improve. This is Smith's temper; he was far from having our conceit of ourselves.

[2] A key phrase also in the *Wealth of Nations*. My italics.

the vanity, not the ease or the pleasure, which interests us.'[1] Then, there is that shrewd definition of the purpose of education: 'The great secret of education is to direct vanity to proper objects.'[2] From this it might be deduced that vanity is wholly useless, selfish, and frivolous. But this, emphatically, is not Smith's view; he shows very clearly how vanity itself has a social function and regard, being itself derived from sympathy. Men desire 'to stand in that situation which sets them most in the view of general sympathy and attention. And thus, place, that great object which divides the wives of aldermen, is the end of half the labours of human life.'[3] 'Compared with the contempt of mankind, all other external evils are easily supported.'[4] But, further, vanity can and does develop into a relatively *worthy* sentiment when it is allied to the desire for the esteem of others. Vanity so motived Smith considers capable of modified approval, as pride; not in itself—for in itself it is a vice,[5] but because it is capable of development into magnanimity. 'The desire of the esteem and admiration of other people, when for qualities and talents which are the natural and proper objects of esteem and admiration, is the real love of true glory; a passion which, if not the very best passion of human nature, is certainly one of the best. Vanity is very frequently no more than an attempt prematurely to usurp that glory before it is due.'[6] But justified pride and magnanimity are certainly precious social virtues, essential links between the personal and the social advantages. 'That degree of self-estimation, therefore, which contributes most to the happiness and contentment of the person himself, seems likewise most agreeable to the impartial spectator.'[7] The word 'degree' should be noted. For it *is* a question of degree, especially where excess of pride is anti-social. So the psychological basis may be merely individual: 'Every man, as the Stoics used to say, is first and principally recommended to his own care, and every man is certainly, in every respect, fitter and abler to take care of himself than any other person.'[8] But this start is built up into a 'golden mean' theory of that degree of self-interest which also best serves society.

Here then we have the picture of the prudent man, of whom *homo oeconomicus* of the *Wealth of Nations* is just the economic facet. Especially I wish to stress, as showing how the second book is founded on the first, that in his account of the prudent man in the *Moral Sentiments*, Adam Smith quite explicitly underlines his economic side. This occurs in his first treatment (in pt. vi, sect. i). 'In the steadiness of his industry and

[1] *M.S.*, pt. i, sect. iii, ch. ii, p. 48.
[2] Ibid., pt. vi, sect. iii, p. 230.
[3] Ibid., p. 55.
[4] Ibid., p. 56.
[5] Ibid., p. 226: '[Vanity] always, and [pride] for the most part, involve a considerable degree of blame.'
[6] Ibid., p. 230. This description of vanity is surely very shrewd.
[7] Ibid., p. 232.
[8] Ibid., sect. ii, ch. i, p. 193.

frugality, in his steadily sacrificing the ease and enjoyment of the present moment for the probable expectation of the still greater ease and enjoyment of a more distant but more lasting period of time, the prudent man is always both supported and rewarded by the entire approbation of the impartial spectator, and of the representative of the impartial spectator, the man within the breast'—in sum by informed public opinion, and by his own conscience: thus the teacher of moral philosophy, not economics, in the early 1750's. In broader terms, prudence is the balancing virtue, as is temperance in Greek ethics. It is the mediating virtue in individual conduct, the base colour which best brings out the qualities of the individual colours, if there in proper measure; so also for economy, the right proportion of factors or goods for proper production or consumption.[1] Prudence can therefore operate between the more ordinary as well as the highest claims, and it borrows its elevation from the level of its material. When it refers only to health or fortune or rank, it commands no more than a 'cold esteem'. But it can also operate on the 'more splendid virtues', valour, benevolence, justice. 'This superior prudence . . . necessarily supposes the art, the talent, and the habit of disposition of acting with the most perfect propriety. . . . It necessarily supposes the utmost perfection of all the intellectual and of all the moral virtues. It is the best head joined to the best heart.'[2] Here certainly the prudent man is at once his own and society's best friend. In a final reference (pt. vii, sect. ii, ch. ii, 'Of those systems which make Virtue consist in Prudence') the comparison of prudence to the epicurean virtue of temperance is carried through, though for Smith prudence has a wider range of material. 'Temperance, in short, was, according to the epicurean, nothing but prudence with regard to pleasure.'[3]

It is, however, in his criticism of those who regard benevolence as the supreme virtue that we see the typical Smithian common-sense regard for the facts. For 'this system seems to show the contrary defect, of not sufficiently explaining from whence arises our approbation of the inferior virtues of prudence, vigilance, circumspection, temperance, constancy, firmness'.[4] 'Regard to our own private happiness and interest appear [*sic*], too, upon many occasions very laudable principles of action. The habits of oeconomy, industry, discretion, attention and application of thought are generally supposed to be cultivated from self-interested motives, and at the same time are apprehended to be very praiseworthy qualities which deserve the esteem and approbation of everybody.'[4] Lack of proper self-regard 'would undoubtedly be a failing'. 'Carelessness and

[1] I have developed this comparison between economy and temperance (or prudence for Smith) in *Economic Efficiency and Social Welfare*, pp. 114–18.

[2] *M.S.*, pt. vi, sect. i, p. 191.

[3] Ibid., pt. vii, sect. ii, ch. ii, p. 262.

[4] Ibid., ch. iii, p. 269.

lack of oeconomy are universally disapproved of, not however as proceding from a want of benevolence, but from want of proper attention to the objects of self-interest.'[1] The 'proper' is the vital word. It links with 'the *proper* degree of all the affections', which Smith regards as the right system, so long as 'sympathy or the correspondent affection of the spectator' is made the 'natural and original measure of this proper degree'.[1]

Here then, it is submitted, we have a theory of the prudent man, of self-love, which is carefully fitted into the theory of society, as operative through the working of sympathy and reason constructing the detail of moral rules and economic institutions as essential guides to appropriate action. The prudent man may respect social opinion as one of his highest criteria. In his personal career he therefore seeks to find his own happiness through earning social esteem. In this way self-interest can dovetail with society's benefit (though wherein that benefit may consist is a deeper question). And in this prudent self-love, the *Moral Sentiments* explicitly mentions the *economic* interest, indeed mentions it first, and so presumably of primary importance. This, it is submitted, gives us sufficient proof that the economic man of the *Wealth of Nations* is himself assumed by Smith to be a servant of society, so far as he is truly prudent, or acts appropriately. If this is so, far from there being any clash between the two books, the later one gives merely a particular development of the broader doctrine in the first. The economic man is the prudent man in the economic sphere. So the economic man also is under the sway of social sympathy and the impartial rulings of the informed spectator.

V

If this view of the *Moral Sentiments* is correct, what conclusion follows as to its connexion with the *Wealth of Nations*? It would appear that the *Wealth of Nations* is simply a special case—the economic case—of the philosophy implicit in the *Moral Sentiments*. It works out the economic side of that 'self-love' which is given its appropriate place in the developed ethical system of the earlier book. For self-love is there an essential element in virtue, or in the good life in society.

This seems to be the obvious view. Adam Smith was a man of stable integrated character, not subject to deep intellectual doubts or fissures. It is quite unlikely that such a man would write two books over the same period, the one adopting virtue, propriety, rational sympathy as the final human good, the other insisting on the social value of a self-interest which could with any truth be equated to selfishness. The 'over the same period' should be remembered. There were five editions of the *Moral Sentiments* between 1759 and 1789. In them, the alterations were not extensive. But

[1] Ibid., pp. 270, 271. This doctrine is developed in pp. 273, 274.

in the sixth and final edition of 1790 the corrections and additions were considerable.[1] Yet there is no hint that Smith himself thought there was any conflict of doctrine between the two books. If we accept this, it follows that, if any conflict there is, it arises from the view either that the *Moral Sentiments* did in fact condemn 'self-love', or that the doctrine of self-love (or interest) in the *Wealth of Nations* in fact advocates selfishness. The former, we have seen, is the reverse of the truth—self-love is carefully and positively valued.[2]

As to the latter argument, it is here asserted that the two main principles which span the crucial breach between the individual and the social interest are *the same* in the *Moral Sentiments* and the *Wealth of Nations*—the latter simply reproducing the former. These principles are that of the invisible hand, or Natural Harmony, and that of the system of natural liberty of the individual, or the right to justice. The central importance of 'the obvious and simple system of natural liberty' is well described in the *Wealth of Nations* (ii. 180). But it should be noted that Smith at once adds the second 'duty' of the 'sovereign', that of 'protecting, as far as possible, every member of the society from the injustice or oppression of every other member of it, or the duty of establishing an exact administration of justice'. This recognizes the inevitable clashes that must arise from individual liberties. Does it not also install the 'sovereign' as here representing the 'invisible hand' in the everyday world? If so, the considerable controlling duties given to the State in Book V naturally follow. The invisible hand passages[3] are indeed almost identical in logic; though, as one would expect, that in the *Wealth of Nations* is worked out economically, in the strategic respect of capital accumulation and direction. The *Wealth of Nations* also elaborates the 'deception' idea: 'Nor is it always the worse

[1] Cf. *Moral Sentiments*, advertisement to 6th edition; and Rae, *Life of Adam Smith*, ch. xxxi.

[2] We may here note that a similar situation arises as to Smith's *Lectures on Justice, Police, Revenue and Arms*. In the latter, the link with the *Moral Sentiments* is mentioned only once—at the outset. There, the two principles 'authority and utility' are stated as those 'which induce men to enter into civil society' (*Lectures*, p. 9). Commenting on the continuing influence of 'superior wealth' in 'contributing to confer authority', Smith then remarks: 'This principle ["the strong propensity of (the poor) to pay (the rich) respect"] is fully explained in the *Theory of Moral Sentiments*, where it is shown that it arises from our sympathy with our superiors being greater than with our equals or inferiors.' Sympathy is therefore the force behind authority and utility. Thereafter, the treatment of justice becomes at once legalistic, the language technical, as we might expect. This, it is submitted, is in exact analogy with the *Wealth of Nations*. Both are applied science in relation to the *Moral Sentiments*, the one in Jurisprudence, the other in Economics. Yet no one has suggested that the *Lectures* conflict in principle with the *Moral Sentiments*. Is it not always the case that an author writes on different topics in a different manner and language? Could not a similar situation be found in the different works of John Stuart Mill, or Herbert Spencer, or Henry Sidgwick? Do not both the *Lectures* and the *Wealth of Nations* trace specific lines of development in the social workings of rational sympathy, in the institutions of law and economy? There seems no obvious reason to expect more coherence than appears.

[3] *M.S.*, pt. iv, ch. i, p. 162; *W.N.*, vol. i, p. 400.

for the society that it (the individual's intention) was no part of it (the end). By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good.' 'The statesman who should attempt to direct private people in what manner they ought to apply their capitals' is equally criticized. It should be noted, however, that it is the passage in the *Moral Sentiments* which gives the specific source for economic theory and action: the 'capacity of the human stomach' passage, which 'obliges' distribution of his surplus by the landlord, and so gives scope for economic exchange.[1] This line of argument has, of course, a rich history; and it is reproduced in almost identical terms and effect in Book I, Chapter XI of the *Wealth of Nations* ('of the Rent of Land').[2] The connecting link could hardly be more explicit.

The argument as to Natural Liberty is, as one would expect, much more fully analysed in the *Moral Sentiments*. In the *Wealth of Nations* it is rather an assumed and accepted standard of judgement. The *Moral Sentiments* argument is a reflection of the God-directed structure of the universe and of society. Through his intended liberty, and so far as he carries out the dictates of justice, the individual at once best serves his own purposes and his proper function in society. Here Smith's models are Stoic, though he criticizes the 'perfect apathy'[3] of Stoicism, and indeed himself proposes a more positive role for natural liberty in his theory of self-love.[4] The argument is the same in both works. What the *Wealth of Nations* does show up is the width of the large unbridged gap between the social and the individual interest, for it is specially obvious in economic affairs. The invisible hand passage in the *Wealth of Nations* is indeed introduced[5] in an unduly dogmatic passage, by the natural harmony argument: 'Every individual is continually exerting himself to find out the most advantageous employment for whatever capital he can command. It is his own advantage, indeed, which he has in view. But the study of his own advantage naturally, or rather necessarily, leads him to prefer that employment which is most advantageous to the society.' This is a constant theme in the *Wealth of Nations*—the inadequate benevolence of the 'butcher, the brewer, or the baker' is only the *locus classicus*. The spring and source of economic activity is constantly described as the 'desire of bettering our condition, a desire which, though generally calm and

[1] Ibid., p. 162.

[2] *W.N.*, vol. i, p. 150.

[3] *M.S.*, pt. vii, sect. ii, ch. i, p. 259. 'Apathy' has of course Stoic origin.

[4] Smith speaks with obvious approval of the 'Ancient Stoics' opinion' that 'the vices and follies of mankind made as necessary a part of [God's] plan as their wisdom or their virtue; and by that eternal art which educes good from ill, were made to tend equally to the prosperity and perfection of the great system of nature' (ibid., pt. i, sect. ii, ch. iii, p. 35).

[5] *W.N.*, vol. i, p. 398.

dispassionate, comes with us from the womb, and never leaves us till we go into the grave'.[1] This is the economic form which the energy of self-love takes. Its political form is even more important, as the claim for justice or personal liberty.

While Smith's self-love theory is certainly crucial, it equally certainly does not imply an unduly high estimate of men's moral quality. Smith constantly harps on human inadequacies—'the coarse clay of which the bulk of mankind is formed'.[2] Nor are his strictures confined to 'the bulk of mankind'. Could anything be more savage than this: 'All for ourselves and nothing for other people, seems, in every age of the world, to have been the vile maxim of the masters of mankind.'[3] Or again, 'A revolution of the greatest importance to the public happiness was in this manner brought about by two different orders of people who had not the least intention to serve the public. To gratify the most childish vanity was the sole motive of the great proprietors. The merchants and artificers, much less ridiculous, acted merely from a view to their own interest, and in pursuit of their own pedlar principle of turning a penny wherever a penny was to be got.'[4] If the clay is as coarse as all that (fortunately it is not) all the wisdom of the Greatest Artificer would be in vain. More than 'a deception' would be needed. Yet the last Stoic quotation shows that this very exaggeration underlines the firmness with which he grasped the central doctrine of democracy, the sacred right to be wrong. The true line of criticism seems to me to be rather that put by James Bonar.[5] With Smith, 'God's in his Heaven, all's right with the world' is too easily assumed, in view of his very realistic estimate of human nature. Thus in effect it is almost impossible to understand in any detail just how the 'deception' of individuals can work out to social benefit, or on what principle liberty can discern the right social path, or when or how it may be merely negative, offering a 'free-for-all', and when and how it may light the path for creative progress. The *logical* rationalization of self-love is certainly given in the *Moral Sentiments*. But one should not expect a convincing reflection in the *Wealth of Nations*. For this would need to be on the philosophical level. The *Wealth of Nations* keeps to economics.

It is, however, vital to remember that these convictions as to the right function of self-love are reflected and assumed in the *Wealth of Nations*, though in the second work a mere reference to them at the start is considered a sufficient explicit link. The *Wealth of Nations* begins on the Division of Labour. But this is itself traced farther back: 'it is this same trucking disposition which originally gives occasion to the division of

[1] *W.N.*, vol. i, p. 305.
[2] *M.S.*, pt. iii, ch. v, p. 142.
[3] *W.N.*, vol. i, p. 367.
[4] Ibid., p. 369.
[5] *Philosophy and Political Economy*, pp. 177 et seq.

labour' (a fact upon which modern thought has cast legitimate doubt). But this itself is not Smith's ultimate economic propensity, as is sometimes assumed. This 'propensity to truck, bargain and exchange'[1] is itself probably 'the necessary consequence of the faculties of reason and speech'; and also 'man has almost constant occasion for the help of his brethren, and it is in vain to expect it from their benevolence only. He will be more likely to prevail if he can interest their self-love in his favour. . . . Give me that which I want, and you shall have this which you want.'[1] So self-love is the definite source in the *Wealth of Nations* of exchange activity. And this is vital. For it is just because the self-interest of the *Wealth of Nations*[2] has been identified in isolation with selfishness that the latter work has so often been described as in opposition to the former. But when it is realized that the same theory of self-love holds for both, and that it includes the virtue of economy, which is in principle as much stressed in the *Moral Sentiments* as in the *Wealth of Nations*, then this suggestion of inconsistency disappears.

A final paragraph is no place to begin describing the eighteenth-century doctrines of self-love. Some dogmatism will be allowed, for the general theory is well known. Briefly, self-love was regarded by all the eighteenth-century thinkers as at least one basic, final, and abiding motive in individual action: only benevolence could with some writers challenge precedence. There is, of course, a wide range between Hobbes and, say, Butler. But all accepted our wider self-interest as a natural, indeed *the* natural approach to the study of ethical behaviour. In this galaxy Smith approaches very near to Butler, especially in his emphasis on conscience, though he adds insights of his own through the impartial spectator. Here then we have the source of confusion between the eighteenth century and today. They regarded proper self-love as obligatory and admirable; we tend to equate it with selfishness.[3] The issue has been vividly analysed by Erich Fromm.[4] He argues that our thought has gone wrong here

[1] *W.N.*, vol. i, pp. 12, 13. Cf. *Lectures*, pp. 160, 171, where 'the self-love of his fellows' and 'the principle to persuade' are given as the sources of the 'propensity to barter'.

[2] Constantly there given its economic expression as 'the uniform, constant and uninterrupted effort of every man to better his condition' (i. 306).

[3] To say it all depends on how high a view you take of the 'self' is too easy as a general solution, though obviously the higher that view the less place for selfishness. But probably we are the hypocrites here, the eighteenth century the realists. The reason for this change is, however, probably mainly historical. It stems from the emotional stresses arising out of the Reformation. So far as the individual was regarded as essentially and originally selfish, indeed predestined to sin, the equation of self-love with selfishness was almost inevitable. It only reflects the general Puritan reaction (if we can use Puritan in a broad, loose way) to pleasure-seeking, as contrasted with that of Roman Catholicism. No doubt Puritans would think the latter rather cynical, whereas Catholics would stress their own realism, and suggest hypocrisy in the other view. However this may be, these growing tensions seem responsible for our tendency simply to misinterpret doctrines of appropriate self-love, such as Smith gives us.

[4] *Man for Himself*, especially ch. iv, sect. 1.

because 'self-interest' has been accepted in a too exclusively subjective sense: 'Self-interest was no longer to be determined by the nature of man and his needs; correspondingly, the notion that one could be mistaken about it was relinquished and replaced by the idea that what a person *felt* represented the interest of his self was necessarily his true self-interest.'[1] And he contrasts the 'objective approach' of Spinoza: 'To him, self-interest, or the interest "to seek one's profit" is identical with virtue.'[1] Now, our argument has underlined throughout the *objective* element which Smith gave to his view of individual activity in society, producing moral rules and conventions and social institutions. So the arguments for a merely selfish interpretation of self-love are least applicable to him. True, Smith does say we are led by 'nature' to benefit society by a deception. But the deception does not imply that he thinks we always act from positively selfish motives. It only (truly) describes the limitations of scope and vision in the *understanding* of the ordinary man. It is then a wise dispensation that 'nature' should so induce us. The prime personal factor binding individuals in society is, however, the emotional one. 'Man, it has been said, has a natural love of society. . . . The orderly and flourishing state of society is agreeable to him, and he takes delight in contemplating it.'[2]

Smith's rather original broadening of the 'self-love' analysis was very possibly confirmed by his criticism of Mandeville's 'private vices, public benefits' argument.[3] For he insists that Mandeville's paradox holds water only if we regard *asceticism* as the standard of private virtue. In fact, here as elsewhere, we should seek the 'golden mean'. Mandeville's private vices may well be justifiable indulgences necessary to social progress. To Mandeville, passions are evil. To Smith they are natural, but to be duly restrained. And the positive agent in restraint he finds, not in any revulsion from due self-love and developing wealth, but in the growth of moral rules and social institutions to control them appropriately, through the slow working of informed sympathy. Here, surely, Smith was broadly right. Criticism should be directed rather to the considerable inconsistencies that remain in what is after all a broad, free sketch, with many unfilled spaces. This theory of the individual can indeed be specially recommended today; for we are open to bias here, when so often the approach is from the assumed primacy of society's claim. We do well to study this cool account of the individual's value and function.

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[1] Fromm, op. cit., pp. 134, 133. Smith himself refers to this personal feeling. His 'fallacious sense of guilt', *M.S.*, pt. ii, sect. iii, ch. iii, p. 98, has almost a Freudian ring, especially as he illustrates by 'Oedipus and Jocasta'.

[2] Ibid., sect. ii, ch. iii, p. 80.

[3] Cf. Bonar, op. cit., pp. 154, 171 and reference to *M.S.* there given.

NON-PECUNIARY ELEMENTS AND BUSINESS BEHAVIOUR

By JOHN H. DUNNING

I

EMPIRICAL research has shown that while the traditional profit maximizing postulate of firm analysis might be satisfactory as a first and very simplified approximation of conditions in the real world, non-monetary considerations are far too important to be omitted from other than the most superficial analysis of business behaviour. However, though the general significance of such factors is recognized by most economists today, the means of evaluating them and the methods by which they might be incorporated into the existing framework of the theory of the firm are matters about which there is still some divergence of opinion.

Professor Machlup for instance, while believing that non-pecuniary elements may play an important part in influencing business behaviour without making such behaviour uneconomic, considers it to be 'methodologically sounder if we do not reduce such non-pecuniary satisfactions and dis-satisfactions (utilities and disutilities) of the business man to money terms and do not try to make them part of the profit maximisation scheme of the firm'.[1] With this in mind, he then goes on to say that 'it is preferable to separate the non-pecuniary factors of business conduct from those which are regular items in the formation of money profits'.[2] In other words, until more convincing evidence is forthcoming as to the exact influence exerted by these non-monetary factors, Machlup prefers to accept the traditional theory as it is—a first approximation to business conduct.

Other economists such as J. de V. Graaff[3] go to the opposite extreme and argue that utility should replace money profits as the maximand determining business conduct. Graaff, like Machlup, recognizes that the supply curve of entrepreneurial service may well involve a variable element of subjective costs which cannot be ignored when the conditions for a determinate equilibrium are being considered. He also believes that 'such services cannot be converted into money terms and added to the costs of the firm'[4] but rather than accept Machlup's solution to the problem he would appear to reject the profit maximizing hypothesis altogether and

[1] F. Machlup, 'Marginal Analysis and Empirical Research', *American Economic Review*, vol. xxxvi, Sept. 1946, p. 526.

[2] Ibid., p. 526.

[3] J. de V. Graaff, 'Income Effects and the Theory of the Firm', *Review of Economic Studies*, 1950/51, vol. xvii, and others cited by Graaff in this article.

[4] Graaff, op. cit., p. 80.

turn instead to the maximization of utility as the general end of entrepreneurial activity, with profit maximization as a special instance.

A third school of thought, in falling midway between these two approaches, has attempted to suggest means by which non-pecuniary elements might be incorporated into the existing framework of firm theory. In sympathy with this third approach, this note discusses three possible ways by which the importance of these non-pecuniary elements might be evaluated and in Section IV suggests an extension of the technique already evolved by Scitovsky, Higgins, and others[1] to cover some of the more important variables omitted in the preference patterns as depicted by these economists. Throughout this paper, we shall confine ourselves to static analysis, and the assumptions underlying the construction of any indifference curves depicted are subject to the same limitations as those of the more familiar consumer preference patterns.

II

In Fig. 1 the traditional total net profits curve (T.N.P.[1]) indicates the maximum amount of money income that can be earned at varying levels of output, assuming that, for any particular output produced and sold, costs are minimized and a price is charged consistent with the maximum revenue that can be earned.

Superimposed on this 'objective' relationship, indifference curves can be drawn which depict the business man's 'subjective' valuation of the two variables, each indifference curve indicating a particular level of satisfaction enjoyed. As constructed in the diagram, the indifference curves are drawn concave upwards sloping upwards to the right. Such a preference pattern indicates that, as more output is produced, ever-increasing profits have to be paid to compensate for the decreased amount of leisure enjoyed and/or the increased irksomeness and responsibility (be it physical or mental) associated with an expanding business.[2]

The business man who believes that 'the best of monopoly profits is a quiet life'[3] or that the ideal aim is 'to combine the minimum of business with the maximum of pleasure'[4] is likely to have a preference pattern of this nature. On the other hand, indifference curves sloping downwards to

[1] Cf. T. de Scitovszky, 'A Note on Profit Maximisation and its Implications', *Review of Economic Studies*, 1943, vol. xi; B. Higgins, 'Elements of Indeterminacy in the Theory of Non-Perfect Competition', *American Economic Review*, vol. xxix, Sept. 1939; M. W. Reder, 'A Reconsideration of the Marginal Productivity Theory', *Journal of Political Economy*, vol. lx, Oct. 1947. Also see S. Weintraub's *Price Theory* (Pitman, 1949), especially chaps. 3 and 6.

[2] For an analysis of factors determining the 'dis-utility of effort' see A. E. C. Hare, 'The Theory of Effort and Welfare Economics', *Economica*, Feb. 1951, vol. xviii.

[3] J. R. Hicks, 'The Theory of Monopoly', *Econometrica*, 1935.

[4] D. C. Hague, 'Economic Theory and Business Behaviour', *Review of Economic Studies*, 1949/50, vol. xvi.

the right would indicate that the entrepreneur concerned was willing to substitute output for profits at a decreasing marginal rate of substitution. Such a preference pattern would suggest that the non-pecuniary advantages associated with the control or ownership of a large and expanding business—such as the added prestige value enjoyed or the reduced likelihood of government interference—more than offset any pecuniary losses of profits forgone or non-monetary disutilities thus incurred.

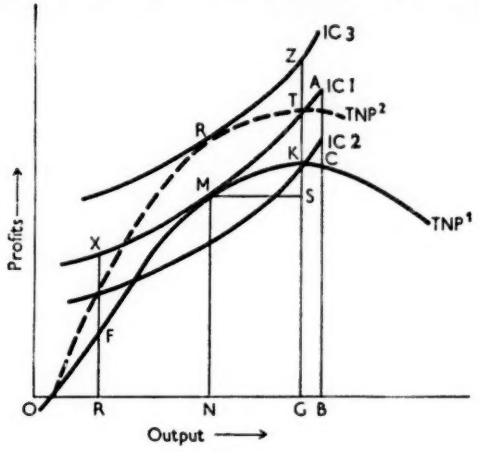

FIG. 1

By its profit maximization hypothesis, traditional economics implicitly assumes that the business man's marginal rate of substitution between output and profits is both constant and zero. As a result, indifference curves, if constructed, would be represented by straight lines drawn parallel to the horizontal (output) axis. Here, a position of equilibrium would necessarily involve an output being produced which is consistent with maximum pecuniary profits. In such a situation the business man is assumed to be motivated solely by the prospect of pecuniary gain, though it is interesting to note that the position of equilibrium would be the same with a U-shaped preference pattern, if it so happened that the output at which profits were maximized was also the output at which non-pecuniary utilities and dis-utilities exactly cancel one another out.

Irrespective of the nature of the business man's preference pattern, however, the position of equilibrium is always indicated by the point of tangency between the T.N.P. curve and the highest indifference curve attainable. Only at that level of output (which, except in the above case, will be above or below the output at which maximum money profits are earned) will the entrepreneur attain his highest level of well-being as afforded by his production and market opportunities.

In attempting to assess the importance of these non-pecuniary elements, we shall suggest three possible ways in which such factors may be given a monetary evaluation. As far as the first two of these are concerned, it will be convenient to evaluate the non-pecuniary gains or losses involved in moving from one point on the total net profits curve to another, and in particular, to compare the position of traditional equilibrium with that position of equilibrium as depicted when the indifference curves are drawn concave upwards sloping upwards to the right. In the case of the third measure, we shall attempt to estimate directly how far traditional economics overestimates the role played by money income as a determinant of business conduct, by adopting a 'before' and 'after' technique, i.e. a comparison is made between the satisfaction derived by a business man at a given output when he has an indifference pattern as assumed by the economist, and the satisfaction derived when he has an indifference pattern that he (the business man) says he has. In each case the non-pecuniary elements will be given a monetary evaluation.

It should be noted that for this part of the article, we shall assume that although the entrepreneur may no longer aim to produce at a *level of output* consistent with maximum money profits, he will still try and obtain the *maximum revenue* possible from the sale of any output produced (i.e. excess demand zero at price charged) and to manufacture that output at the *minimum possible cost*.

III

The first measurement of non-pecuniary elements may be called the *compensating money profit variation*. This is defined as 'the amount of additional money profits with which an entrepreneur would require to be compensated if he were forced to produce at other than the equilibrium level of output, where satisfaction is maximized, and yet still retain the same measure of well-being as enjoyed at that output'. This money compensation will, of course, vary according to the level of output at which the business man is made to produce. It will also differ according to the means by which the compensation is effected, for it should be noted that in order to induce a particular increase (decrease) in output above (below) the equilibrium point, the very nature of the T.N.P. curve must be changed, and this in such a way that the new 'enforced' position of equilibrium gives at least an equal measure of satisfaction to that which might be obtained by moving to any alternative point on this adjusted T.N.P. curve. Generalizing, however, whatever output is being considered, the compensating variation is represented by the vertical distance between the value of the existing T.N.P. curve at the level of output it is desired to enforce and the

indifference curve, which somewhere along its course is tangential to the adjusted T.N.P. curve at the equilibrium output.

To illustrate, let us suppose our business man has a particular output/profit preference pattern and is faced with a particular total net profits curve (T.N.P.^{1}) as depicted in Fig. 1. Let us further assume that it is desired to increase his level of output say to point K, the position of traditional equilibrium.[1] At this point OG output is produced and KG money profits are earned. K as well as being a point on T.N.P.^{1} is also a point on Indifference Curve 2, which indicates a lower level of satisfaction than that enjoyed at the equilibrium output. If, then, our business man is to be persuaded to produce at this level of output yet still retain the measure of satisfaction he previously enjoyed he must be compensated with a certain amount of additional money profits for the loss of his freedom to produce at the output he most prefers. One way for this compensation to be effected is for him to be offered a direct subsidy of TK money income, providing—and only providing—the required output of OG is produced. This subsidy, with the normal increase in money profits of SK, will be sufficient to offset any decrease in leisure and/or increase of entrepreneurial worry that an additional output of NG might entail. Exactly the same conclusions hold (i.e. the compensating variation remains at TK money income) when subsidy is given for all levels of output (except the equilibrium output), providing the locus of the points of the new—the adjusted—T.N.P. curve falls within the area between I.C. 1 and the original T.N.P. curve. But suppose that in an attempt to increase the level of output to OG it is decided that this might best be done by reducing the progressiveness of the tax system in such a way that the slope of the new profits curve is changed from that of T.N.P.^{1} to that of T.N.P.^{2} What now is the compensating variation? Point T no longer represents the new point of equilibrium, for by moving down the adjusted profits curve, the business man is now able to attain an increased measure of well-being as indicated by the tangency of point R with a higher indifference curve, I.C. 3. To allow for this, a money subsidy of ZK—not TK—would have to be paid at output OG. It can be seen that such a method would prove considerably more expensive to operate than a straightforward output subsidy, and this conclusion may be generalized for any type of profit subsidy (or reduction in taxes) given, with the exception of the case outlined above. The actual amount of compensation will naturally vary according to the change in the nature of the tax (subsidy) system and

[1] Strictly speaking this measure could be used to compare any two points along the T.N.P. curve, but since this article is primarily interested in evaluating non-pecuniary elements consequent upon the introduction of output/profit preference schedules, it is natural that all measurements be taken with reference to the traditional equilibrium position.

whether, at all points on the new profits curve the net disposable income is above that earned prior to the change in the tax structure (e.g. the new profits curve might cut the old one somewhere between the tangency of the latter with I.C. 1 and the point T).[1] But, *ceteris paribus*, if there is an all-round increase in subsidies (or reduction in taxes), the more progressive the subsidies given, the greater is the compensating variation that will have to be paid to induce any particular increase in output.

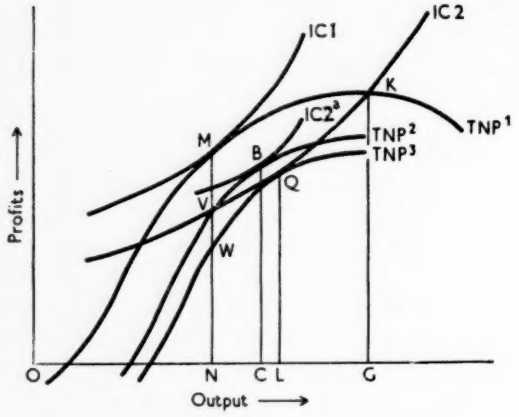

FIG. 2

The compensating variation may be similarly calculated for other levels of output; thus in the straightforward case outlined above, the compensating variation for outputs OR and OB would be FX and CA money profits respectively.

The second measure, which may be termed the *equivalent money profit* is defined as 'the amount of money profits equivalent to the loss of satisfaction experienced through being forced to produce at an output other than that consistent with maximum satisfaction'. As with the compensating variation, this measure varies according to the level of output being considered and the means by which the reduction in money profits is effected. Let us again compare the equilibrium position with that level of output at which profits are maximized, i.e. points M and K in Fig. 2. In this case, however, instead of forcing our business man to increase his output to OG and then compensating him so that he is no worse off than before, we try to estimate the amount of money profits he would be prepared to sacrifice at the equilibrium output rather than being made to produce at output OG with profits KG.

[1] It cannot intersect before this point because this would involve an increased profits tax at output ON and we have assumed that our business man is to be 'coaxed to produce OG output, not bullied'.

Now, it would seem at first sight that the equivalent money profit variation at point M as compared with point K is MV, for with this amount of money profits deducted, an equal measure of satisfaction is experienced at ON output with NV profits as that enjoyed when OG output is produced and KG profits are earned, both point V and point K being on I.C. 2. Whether this is so or not depends on the method by which the reduction in money profits is achieved—for it is assumed that after the deduction the entrepreneur is still allowed to choose the output he will—and it need not necessarily follow that this new equilibrium output will coincide with the old equilibrium output. It is true that an MV profits tax at output ON will reduce our entrepreneur's satisfaction to that enjoyed at point K. But point V, as well as being a point on I.C. 2, is also a point on a new and reduced value profits curve (T.N.P.[2]), though not necessarily the equilibrium point. For instance, if the reduced value profits curve is constructed parallel to the old one (as would be the case if a poll profits tax had been levied) point V can only be the new equilibrium point if the marginal utility of money income is constant, i.e. the slope of I.C. 2 at point V is the same as I.C. 1 at point M.

If, however, point V is not a position of equilibrium on the new profits curve, it follows that the entrepreneur could increase his satisfaction by moving along this curve to its point of tangency with a new and higher indifference curve, i.e. point B on I.C. 2a. And, since we have assumed that our entrepreneur is free to choose what output he will after the appropriate tax has been deducted, then with a tax of MV at output ON our business man will finish up not on I.C. 2 producing output ON and receiving profits NV, but rather on a higher I.C. 2a where he will produce output OC and receive profits BC. He will thus have to be taxed more than MV if, assuming that he is allowed to choose his equilibrium output, it is the aim to reduce his satisfaction to a similar level to that enjoyed at point K with output OG and profits KG. In fact, the equivalent tax must be equal to the vertical distance between I.C. 1 at the equilibrium output and the relevant profits curve at that output which, somewhere along its course, is tangential to I.C. 2. The exact amount will depend upon the nature and shape of this profits curve—e.g. assuming that it is parallel to the original curve, the equivalent money profit variation at the equilibrium output, to a 'forced' production of OG and profits KG would then be MW—W being a point on that profit curve (T.N.P.[3]) which at point Q is tangential to I.C. 2—and where OL output is produced and LQ profits earned.

The practical application of this measure, like the previous one, is to be found mainly in the field of Public Finance. It is clear that the equivalent money profit variation will vary according to whether the money deducted

at the equilibrium output forms part of a poll, proportionate, or progressive tax.[1] Any poll tax levied will have the effect of expanding output, unless the marginal utility of money profits in terms of output is constant, in which caseout put will not change. This is illustrated in Fig. 2, where, as a result of a tax of MW levied at output ON, output will expand from ON to OL and net profits increase from NW to LQ.[2] If the indifference curves are sloping in the reverse direction, then output will, on the same basis of reasoning, contract.

If the income deducted is part of a proportional or progressive tax system, the situation becomes less certain, for as long as the marginal utility of money profits in terms of output is not constant, we cannot say for certain whether an expansion or contraction of output will take place. For in both cases, the slope of the T.N.P. will be less after tax than before, and while a situation similar to that depicted in Fig. 2 will always lead to an expansion in output, if the tax expressed as a percentage of total profits is large, it is quite possible that a net reduction in output may occur. This is all the more likely if the marginal utility of money profits does not decline markedly over the significant ranges of income. With indifference curves sloping in the reverse direction, a proportional or progressive tax would generally be expected to lead to a decrease in output, unless the tax was such a high percentage of total profits, in which case an expansionary effect might result.

The third measure aims at providing a direct estimate of the amount by which traditional economics overestimates the part played by money profits as a determinant of business conduct. In doing so, use is made of the *appropriate money profit variation*, which may be defined as 'the monetary evaluation of the satisfaction gained or lost at any one point on the total net profits curve as the result of the introduction of non-pecuniary elements as depicted in the business man's output/profit preference pattern'.

Here, instead of comparing the satisfaction experienced at different points along the T.N.P. curve, we attempt to compare the satisfaction experienced at the same point under a different set of preference patterns —or, more specifically, a set of preference patterns which traditional economics assumes the business man to have—with those which the business man actually does have.

[1] For a fuller exposition of the effect of varying profits taxes on the supply of entrepreneurial effort see K. Boulding, 'The Incidence of a Profits Tax', *American Economic Review*, Sept. 1944.

[2] It will have been noted that the point at which leisure starts to become a disutility is not necessarily the point at which the appropriate variation changes from gain to a loss. This is dependent on whether the indifference curve passing through the point of the profit curve being considered, is above or below the point at which it intersects the perpendicular dropped from the T.N.P. curve to the horizontal axis at the 'base' output.

Now, since traditional economics assumes an invariable correlation between the amount of money profits earned and the degree of satisfaction or well-being experienced, it follows that the output yielding maximum pecuniary profits is also that which yields maximum satisfaction. Consequently, the profit curve, as usually constructed in its monetary form, is also a 'real' profit curve in the sense that it does not ignore, but merely values as zero, non-pecuniary factors incidental to production. In actual

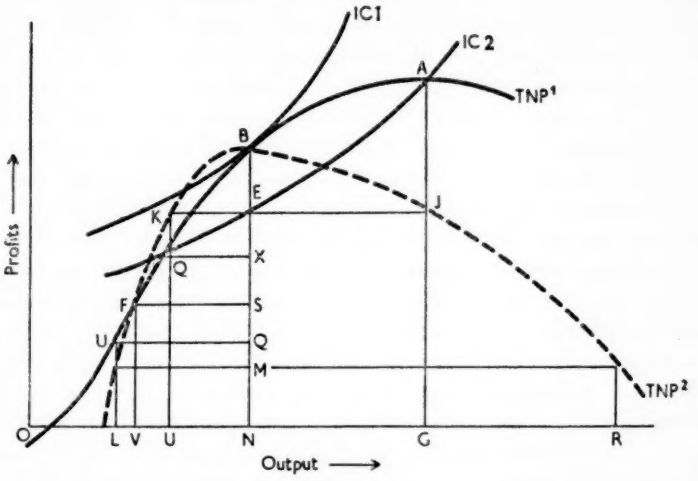

FIG. 3

fact, however, the business man's preference pattern as indicated by the family of indifference curves in Fig. 3 indicates an increasing rate of substitution between output and income, depicting that as output is increased by equal amounts, an ever-increasing amount of additional money profits is necessary to compensate for the irksomeness associated with this task. Given this set of preference functions we see that the position of equilibrium, representing maximum satisfaction, is where *ON* output is produced and *BN* profits earned, i.e. at point *B*. Assuming now that it is desired to make this existing money profit curve include a monetary evaluation of non-pecuniary elements, and therefore a 'real' profits curve in the traditional sense, we can take point *B* to be a representative point on this new profits curve and, using it as 'base', adjust the other points of the original profits curve, corresponding to the different levels of output, in such a way that they may also become indicative of the 'real' profit or satisfaction experienced. The money profit as indicated by point *A*, the position of traditional equilibrium, is now no longer also an indication of the 'real' profits enjoyed, and consequently an adjustment

must be made. Point B is on I.C. 1, point A on I.C. 2. This means that our business man prefers ON output with BN profits to OG output with AG profits. On the other hand, he is indifferent as between ON output with EN profits and OG output with AG profits. Therefore he loses BE real satisfaction as measured in terms of money profit at point B. But at point A this is shown as a loss of money profits of AJ, for, in converting the old real profit AG into the new real profit as measured from B, it can be seen that only JG money profits can remain. Point J now forms a point on the new profits curve, and the same process can be repeated for all other levels of output. Whereas an appropriate money profit loss is experienced at output OG (viz. AJ) an appropriate money profit gain is apparent at output OU (viz. QK), for at this output one can see that a movement from B to K results in a loss of BX money profits but only BE real profits. (Since K and A are on the same indifference curve, $KU = JG$.) In ordinary language we might say that, as far as the latter case is concerned, the loss is not as great as would at first sight appear when only money profit considerations are taken into account, for, in moving from point A to point K on the old profit curve, the additional leisure or reduced entrepreneurial worry thereby gained (NU) will partly offset this loss in money profits.

However, it does not necessarily follow that at all levels of output smaller than the equilibrium level, appropriate gains will be experienced, even if at all levels of output greater than the equilibrium level, there will be appropriate losses. This is because at very low levels of output our business man may well have a surfeit of leisure and would be willing to produce a larger output at a smaller money profit. Fig. 3 illustrates two of these exceptional cases. At output OV, the loss in money profits, consequent upon a reduction in output of NV, is equal to the loss in real income measured in money equivalents (i.e. BS). Here the appropriate money profits gain is zero. At the equilibrium output ON, the appropriate gain is also zero, but for a different reason. Whereas at output OV the additional value placed by the entrepreneur on the reduction in output is zero (because the relevant I.C. cuts T.N.P.[2] curve at point F where $FV = SN$), at output ON, a reduction in output has a positive value at the margin, but there is none to measure, for by the nature of the measure, output ON is used as base against which other outputs and their corresponding 'bundles' of leisure are plotted.

At an even smaller level of output—OL—the preference functions of the entrepreneur indicate that the value of this reduction in output enjoyed is negative. The loss in money profits as indicated by the T.N.P.[1] curve at this output is BQ, while this loss in real income as measured in money equivalents is BM ($UL = QN$). This is larger than BQ by an

amount QM, the latter being the appropriate loss for output OL. It is a loss rather than a gain because the monetary loss incurred through the reduction in output under-emphasizes the real loss, as is shown once non-pecuniary factors are taken into account.

It is interesting to compare an output much larger than the optimum (such as OR in Fig. 3) with a much smaller output (e.g. OL). At both levels appropriate losses are experienced, but whereas in the former case this is due to the irksomeness and worry associated with a high level of output, in the latter case, the business man has a surfeit of leisure, which by now has become a disutility to him.

IV

At this stage of the argument, it would be as well to restate the exact implications underlying the traditional profit maximization postulate. These are three in number, the first two of which serve to remind us of the fact that the total net profits curve as usually constructed is no more than an expression of the difference between the total revenue received and the total cost incurred at varying levels of output.

1. For any given output produced, it is assumed that the costs incurred are kept down to the minimum possible under the circumstances concerned.

2. Likewise, for any given output sold, it is assumed that the price charged is that consistent with the maximum revenue obtainable.

3. Given the nature and shape of the total cost and total revenue curves as determined by the above two conditions, it is assumed that the entrepreneur will strive to produce and sell at that output which yields the maximum profits, i.e. at that point where the vertical distance between the total revenue and total cost curves is at its widest, and where marginal revenue is equated with marginal cost.

Once any one of these three conditions is invalidated, even if the others remain true, the traditional profit maximizing postulate can no longer be said to be the sole criterion of entrepreneurial rationality, even though it may still be the most important determinant of business behaviour.

Now, in our discussion of the three possible ways in which a monetary evaluation might be attached to certain non-pecuniary elements implicit in business conduct, we have assumed the third condition to be violated but not the other two conditions. That is to say, we have taken for granted that whatever the attitude of our business man might be towards leisure or increased output (as income alternatives) he will always attempt to sell his product at a price consistent with the maximum revenue obtainable and will always try to keep his production costs down to the absolute minimum. In studying the effect of the introduction of non-pecuniary

variables on *output* policy, we have assumed that in his *price* and *cost* policies, our business man was still entirely motivated by profit maximization. We have then, as representative of a business man's profits curve, a 'maximum' profits curve, which is but one of a large family of profits curves, and have assumed that, whatever may be the nature of our business man's output/profit preference pattern, the ultimate position of equilibrium will always fall at a point *along* this profits curve.

The implicit assumption of the validity of conditions 1 and 2 in an analysis of this sort, would appear to have been overlooked by a number of writers, who have attempted to demonstrate how non-pecuniary elements may be incorporated into profit maximization theory. How can the subjective determinants of cost and price policy be introduced into a preference pattern between output and profits when the very nature of the T.N.P. curve and its position between the axis is itself a reflection of such policies? Professors Weintraub and Higgins suggest that one reason why business men do not aim at maximum profits is because they do not charge the maximum price possible for any particular output sold. Agreed. But this cannot be shown on an indifference map between output and profits. An altogether new T.N.P. curve—based on factors other than the maximization of money profits for any particular output sold—has to be constructed. It may very well be that a business man might prefer to produce at an *output* consistent with maximum profits, yet charge a *price* below that consistent with maximum profits. But this cannot be explained simply by drawing in indifference curves between profits and output. An extension of the analysis is required, which, in a single diagram would necessitate the construction of a third dimension on which the price variable might be plotted.

Similarly with cost considerations. The output/profits preference pattern we have been considering has demonstrated the irksomeness and disutility associated with the production of different levels of output, but it is not to be supposed that this irksomeness is in any way connected with the problem of cost minimization, for we have assumed that as far as this factor is concerned, the entrepreneur has nothing in his mind but profit maximization. To include non-pecuniary elements associated with cost minimization, e.g. the extra effort needed to see that the most efficient factor combination is hired and that the productivity of each factor service is at its maximum—to include the irksomeness and worry associated with these elements, would mean yet another dimension—that relating to costs.

Consequently the traditional cost and revenue curves of the textbooks are likely to be applicable only in the special case when conditions 1 and 2 both hold good. One must then disagree with Professor Higgins when

he says that the profits curve is likely to contain a greater element of determinancy than the indifference pattern between output and profits.[1] The relationship expressed between the output produced and profits earned is not solely a function of objective circumstances. Just as the equilibrium point along the profits curve is fundamentally determined by the character of the output/profit indifference schedule, so likewise are the nature and shape of the 'equilibrium' cost and revenue curves (i.e. those curves chosen out of all possible cost and revenue curves as most conducive to satisfaction) a reflection of the business man's preference for profits in relationship to a particular non-maximizing price or cost policy.

To construct then, a completely determinate theory (still within the bounds of a static framework) non-pecuniary elements must be studied not only in so far as the relationship existing between output and profits is concerned, but also as between costs and profits, profits and price, output and price, &c., which would involve the construction of multi-dimensional diagrams or multiple regression equations to illustrate the actual position of maximum satisfaction. At the same time, before any practically significant conclusions can be drawn concerning the non-pecuniary elements in business conduct can be drawn, a first prerequisite is for further empirical research to be conducted along these lines. Various glimpses have been given of the attitude of business men towards profit maximization by Mr. Hague and Mr. Wiles and others,[2] but there is clearly a need for more detailed and wider studies to be undertaken. For instance, it is suggested that such elements as the size of the firm, its stage of growth, the nature of the product(s) produced, the market relationships prevailing in both the factor and goods markets, are but a few instances of elements that must influence. in one way or another, business men's valuations of non-pecuniary considerations. If a realistic theory of business behaviour is to be constructed, then surely empirical studies are the first essential to successful progress in this direction.

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[1] Higgins, op. cit., p. 479.
[2] Hague, op. cit., and P. J. D. Wiles, *Price, Cost and Output* (O.U.P., 1957), chap. xi.

INVESTING IN COAL

By D. L. MUNBY

THERE has been a great deal of criticism of investment policy in the nationalized industries, often ill-informed and superficial, even though uttered from the most authoritative quarters. What have been lacking have been adequate criteria by which to judge what has been done, and knowledge of the reasons for the decisions taken. While the criteria may have been adequately discussed at the most rarefied levels, they have not often been related to the particular framework of the nationalized industries and their complex economics. The result has been that informed criticism has not touched the boards and ministries in planning their schemes, though they have been forced to a certain secretiveness by often foolish political attacks.

The first two reports of the recent Select Committee on Nationalized Industries (Reports and Accounts)[1] provided an opportunity for a fresh appraisal of the problem. A great deal of information about what happens behind the scenes is now made available, which should give economists a clearer idea of how investment decisions are actually made. The Select Committee distinguished itself by its sympathetic approach to the nationalized industries, its willingness to learn, and the shrewdness of the questions it asked.[2] By contrast, and not perhaps surprisingly, the reports themselves are rather undistinguished and inconclusive. Having asked the right questions, and obtained quite inadequate answers, the committee was clearly incapable of going further and providing the missing answers itself, and preferred to leave the issues in the air.[3] There was a clear lack of a trained staff able to suggest the appropriate answers and provide that little bit of economic knowledge that would have made the reports a major event in the history of the nationalized industries. The committee do not seem to have taken seriously enough the leads given by the Herbert Committee on the Electricity Industry, which provides an exception to the general picture of amateurish criticism.[4]

The Select Committee in its first report confined its attention to the two Scottish Electricity Boards, though the evidence includes some given by the National Coal Board, with which the second report was

[1] H.C. 1956/7, no. 304, and 1957/8, no. 187–1. All references are to the second report and question numbers, unless otherwise stated.

[2] There are, of course, some exceptions. Colonel Lancaster seemed to spend a great deal of time asking questions on the basis of erroneous information (see, for example, 94–96 and appendix 5).

[3] 'Your committee have been conscious of the absence of a yardstick by which to judge the performance of the Board' (p. v).

[4] *Report of the Committee of Inquiry into the Electricity Supply Industry* (Cmd. 9672, 1956).

concerned. What follows is largely about coal, but the general principles are, *mutatis mutandis*, relevant to other nationalized industries. The persons who gave evidence included Mr. A. T. K. Grant, an Under-Secretary in charge of the Trade and Industry Division of the Treasury (author of *A Study of the Capital Market in Post-War Britain* (1937),[1] who has since moved from the Treasury to other fields); Sir John Maud, Permanent Secretary, and Mr. R. J. Ayres, Deputy Secretary, Ministry of Power, in relation to the National Coal Board; and Sir James Bowman, Chairman, Mr. J. Latham, Deputy Chairman, and Mr. E. F. Schumacher, Economic Adviser to the National Coal Board.

A rough, and perhaps not entirely unjust, comment on the proceedings would be to say that the National Coal Board evidence showed a considerable awareness of the economic issues at stake, the North of Scotland Hydro-Electric Board none at all, the Ministries little, and the Treasury perhaps rather less, so long as it is duly repaid the interest on the nationalized stock or borrowings. The Ministry of Fuel and Power displayed evidence of great gifts in the field of industrial relations, and all the government departments were clearly skilled in diplomacy.

There was a tendency to lean over backwards to be fair to the nationalized boards, which, in view of the often ignorant criticism to which they have been subjected, is commendable. It tends, however, to obscure the problem of criteria, and enables the government departments to evade what might be a most valuable function in providing just this element of hard thought that seems lacking. Instead, they perform the role of a rich and somewhat complaisant uncle, who lavishly finances his nephew's education, is kept in touch with all that is going on at the university which he does not understand, and provides soothing sympathy when things go wrong in the matter of exams, while throwing in at times some rather heavy avuncular advice. Thus Mr. Grant:

'If things are not going the way we like them to, we should talk to the industry and we should say: "Now, we do not like the way things are going. What is all this about?", and ultimately what we should do would not be to say: "No, we shall stop your money next year"; we should move the Chancellor to write to the Minister and say: "This is not going as we hoped it would. What about a discussion?".'[2]

[1] In an earlier book entitled *Society and Enterprise* (1934), Mr. Grant argued that 'risk-bearing must ultimately become a social function if progress is to be maintained. . . . There are only two clear and coherent alternatives, either a system in which the risk-bearing of the individual is adequately rewarded, or a system in which the whole process of risk-bearing is taken over by society as a whole. It is difficult to see how it is conceivable that one could get back to the former state of affairs. . . . There is no evidence that free enterprise can provide either prosperity or a more satisfactory standard of living. . . . The Treasury would have to add to its functions that of an investment syndicate, announcing its willingness to finance new enterprises, weighing up their respective merits, supporting the most promising, deciding scientifically and carefully what amount of money it was prepared to invest during a given period' (pp. 176, 184, 187, 199). See also p. 27 for evidence from the same source as to the criteria to be followed. [2] First Report, 11.

Meanwhile in the Ministry of Power, Sir John Maud:

> If there were a difference of view on policy (between the Board and the Ministry) we should take steps to correct it, in so far as in an imperfect world we can. What is happening to our knowledge is what we think should be happening. . . . There ought not to be . . . a conflict of policy between the Board and the Minister or the Ministry, and if there is we ought to know it. (Q.) But if there was such a conflict would your view, the Ministry's view, prevail? . . . In the last analysis certainly as Permanent Secretary of the Department I should do my best to see that it did prevail.[1]

Brave words, but it is clear from the other parts of the evidence that the processes of friendly and informal discussion are much more fundamental. On the matter of a possible direction from the Minister, Sir John Maud said:

> The relations between the Minister and any Board which retains his confidence, in my experience, is such that really the question is an academic one whether you would have to have a direction if you wanted to do that.[2] [On other points:]
>
> (Q.) Can you assure us that in your view no substantial wasteful investment could take place without you being able to inform your Minister that it was taking place?—. . . . I think we should know afterwards but, quite frankly, I think because the Board would bring it to our attention; I do not think it would be because we have got any spy system.[3]
>
> What we have in fact and what we have had is a sharing of responsibility rather than a control by the Minister of the Coal Board; but you may say that that is only a matter of language.[4]
>
> My colleagues who are concerned particularly with coal in the Ministry are, as Mr. Ayres suggested, in daily contact not only on the investment programme, but on all their problems.[5]
>
> I should like to be emphatic on this, that in the Ministry we have no advisers who would be regarded as experts in the sense of mining engineers. . . . Compared with the Treasury we can claim some expertise because we live with the coal mining industry. . . . I want to be quite clear that we do not pretend to advise the Minister on, for example, the technical propriety or impropriety of any detail in their development plan.[6]
>
> I cannot think of a case where I have thought it right to advise the Minister that he ought to take outside opinion in order to check on a technical point what the Board tell us.[7]

And Mr. Grant:

> (Q.) To what extent do you duplicate what is going on in the Ministry of Power in regard to checking on investment plans? . . .— There is an element of coordination which I think we particularly can contribute. Over and above that, it is a question of several people looking at the facts and of getting a balanced view from these several viewpoints. . . . Somebody looking at it afresh from outside may often help to arrive at the right answer.[8]

[1] 28–30. [2] 67. [3] 59–60. [4] 244. [5] 15. [6] 10–11.

[7] 32, cf. 40, and 568–9. (Mr. J. Latham on the Ministry): 'Of course we regard them as our friends and helpers rather than as our inquisitors.'

[8] 693, cf. also 2, 8, 42 (from Sir John Maud's viewpoint). There has been more consultation over coal than other nationalized industries (First Report, 13–14; Second Report, para. 23 and Q. 31).

I

My concern is mainly with criteria by which to judge programmes, not with the results achieved in comparison with the programme; the stress is on the criteria, not on the accuracy of the forecasts or the means of testing performance. It is the lack of criteria, not the performance, that most needs criticizing in the case of the nationalized industries. There are roughly three possible criteria for judging investment programmes.

1. The first criterion is a simple one of physical output. An output programme is planned by reference to rates of growth of the economy as a whole and the particular demands for this commodity. A target output (or set of targets) is given for a certain date from which it is possible to estimate how much investment is required to expand output to the required level.

2. The second criterion is that of covering costs, taken in the simple-minded accountancy sense. Thus there are a certain set of rules for depreciation of the assets in question, there is a given cost of borrowing for the industry in question, and there is a certain price at which output is currently sold. On certain simple assumptions about future changes in wages and costs of raw materials, &c., bought by the industry, and likely (or unlikely) changes in demand prices, it is possible to estimate whether proposed investment schemes will cover their costs.

3. The third criterion is that of the expected yield on capital investment compared with yields on alternative forms of investment. To judge this properly, interest rates, depreciation formulae, and prices have to be estimated according to economic, and not merely conventional, criteria.

Roughly speaking, it is clear that the nationalized industries use a combination of the first two criteria, whereas the Herbert Committee followed the preferences of economists in favouring the third yardstick. The reports of the Select Committee make it clear what difficulties arise from the use of the first two criteria in the peculiar conditions of the nationalized boards, but the questions asked by the members show that they were looking for ways of applying the third yardstick, apparently without much success.

Before discussing these criteria in detail it is necessary to refer to the background problems of pricing policy, depreciation, and, in the case of coal, wastage.

(*a*) *Pricing policy.* The practice with both coal and electricity is to average prices. It is not my concern to repeat the well-known arguments against these policies. Pricing policy is a separate matter from investment policy. But an average-price policy makes it very difficult to estimate investment results. Whatever the rights and wrongs of pricing policy,

a proper investment policy must be based on the value to the public of the additional units sold, and the opportunities forgone in other directions. It should, that is to say, be based on long-run marginal costs (shall we say of a given power-station or pit?) and market prices.

In the case of electricity, there is averaging between peak and off-peak periods and as between town and country; in the case of coal, prices are averaged so that the industry does not make profits. This results, in the latter case, in the fact that 'in 1956, the collieries made a small average operating profit (before charging interest or profits tax) of 2*s*. 7*d*. a ton; about half of the collieries showed profits and about half showed losses'.[1] This is apparently an empirical statement about the distribution of colliery costs (and sizes), even though it is prefaced by the misleading statement that 'when average price just about covers average cost, it is a matter of mathematical necessity that something like one half of the industry's output is produced at a profit and the other half at a loss', as there is no mathematical necessity that the arithmetic mean and the median should correspond, nor that about half the number of pits should produce about half the output.

The Select Committee was concerned with the report and accounts for 1956, though 'opportunity was taken by question and answer to review the 1956 results in the light of what had happened since'.[2] Though by April 1958 when their second report was signed, there were signs of market pressure on coal prices, this was by then not at all generally clear, though there seemed to be critical points in the field of small coal and in relation to competition from oil.[3] But coal was still rationed to domestic users and its prices subject to considerable control.

Hence, the pertinence of Mr. Albu's comment: 'What I cannot understand is how you can in fact judge the economic value of a project on a costed basis when in fact there is no market price for the finished coal. There is a managed price for coal.'[4] If it is assumed that more or less the right amount of coal is being produced, investment will very likely, if not certainly, take place in pits where losses are being made. Prices cannot be related to costs at particular pits.

'It would not be practicable to have a separate price structure for each separate colliery so that you did in fact break even', as Mr. Latham, the Deputy Chairman of the N.C.B. put it; 'We do not regard those collieries which are within narrow margins of the break-even point as creating any special problem except the general one of trying to improve their efficiency.'[5]

(*b*) *Depreciation.* Confusion has often arisen from failure to distinguish

[1] App. 21, p. 158. [2] P. v.

[3] The committee devoted a good deal of its attention to the large/small coal problem. See pp. xix–xxi, and evidence of 5 Feb. 1958, pp. 56–71 (355–495).

[4] 129. [5] 543.

between the different aspects of depreciation policy. There is taxation policy, the accounting problem, and pricing policy. There may well be a case for not allowing depreciation on any other than a historical cost basis as an allowance for tax purposes; this is not in question here. There can be little case for not publishing in a firm's accounts the adjustments that would be necessary in a time of rising prices if depreciation were to be reckoned on a replacement basis; in so far as accountants do not do this, it is a limitation on the usefulness of their accounts. But whether provision for depreciation at replacement cost is counted before 'profits' are declared, or is reckoned to be a first claim on profits, is largely a matter of semantics (though no doubt likely in practice to be determined by the philosophers of the Inland Revenue Department)—so long, that is, as the figures are plainly published for those concerned. The question of pricing policy is more important and relevant for our purposes.

The Herbert Committee came down squarely on the principle that

> the price charged for electricity should be sufficient to recover from consumers the real value of the resources used up each year in serving them [and that] in presenting the accounts of the industry the surplus should be stated only after charging for depreciation on the above basis, [but that] the industry should not build up reserves for financing its own expansion.[1]

The second point is stated to be 'a matter of accountancy presentation', and is justified on grounds of clarity. It is the first point with which we are concerned, and the principle seems a right one for the nationalized industries, on the grounds stated:

> In the case of a State-owned monopoly, however, on which competitive forces do not operate strongly, prices must be determined by a process of calculated assessment. It seems to us that a proper element in arriving at these prices is the cost of the resources used up in the process of manufacturing and delivering the product—in this case electric power. It also seems to us that this cost should reflect current price levels rather than those ruling at the time when the plant was originally installed.[2]

This principle is accepted by the National Coal Board, whose general price policy is stated as follows:

> Having regard to the statutory position, and subject to H.M. Government's judgment of the public interest from time to time, it is the Board's policy to charge prices which will
>
> (*a*) cover costs;
>
> (*b*) provide for the replacement of fixed assets at current prices;
>
> (*c*) make such further contribution towards the financing of capital investment as may seem desirable according to circumstances.[3]

[1] Cmd. 9672, p. 146, and paras. 330–8, 342–6. The last point is also made by the Monopolies Commission in the case of the British Oxygen Company: 'We do not think that a monopoly should take advantage of its position to charge current consumers with the cost of its future expansion as distinct from replacement' (*Report on the Supply of Certain Industrial and Medical Gases*, H.C. 1956/7, no. 13, para. 262, majority report).

[2] Op. cit., para. 331. [3] First Report, p. 155.

The third point might seem to offend against the Herbert Committee's recommendations, but in fact the Coal Board requires special treatment for reasons discussed below.

The actual figures in terms of depreciation at historical cost, according to the Coal Board's accountants' definitions,[1] work out at a total of about £45 million, which should be compared with £60 million at replacement cost. Capital expenditure has only been above depreciation at replacement cost from 1952 onwards, since when the excess has been running at 'about £150,000,000'.[2]

But actual prices have not in fact covered depreciation at replacement cost. Much has to do with 'H.M. Government's judgement of the public interest from time to time'. Sir John Maud was questioned about pricing on a replacement cost basis, 'when you are considering the elements that go to make up the pricing of coal'; he replied:

> Again, to be pedantic, we do not do this. It is the Coal Board who present to us the results of their calculations. . . . We have often had discussions with them, . . . and in fact I think both they and we have agreed about the advantages of increased self-financing so far as that is concerned. . . . On the question of whether at this particular point of time you so put up prices as to increase the amount of self-financing, that is part of the general question of how much you should at the moment put prices up in view of all the circumstances and the state of the economy. (Q.) Then you do not consider it so important that they must cover depreciation at current costs of replacement—that you would always allow them to earn enough to do that?—Certainly not. There is no overriding priority for that or for any other one consideration.[3]

This seems, with its rather odd use of the phrase 'self-financing', to imply a failure to understand the issues at stake, especially in the light of the clear lead given by the Herbert Committee.

Mr. A. T. K. Grant of the Treasury was perhaps a little more explicit:

> (Q.) Ought not the price of coal to cover . . . not only the depreciation of plant, but also the surplus necessary to allow for the maintenance of production at that level?—Yes, speaking subject to the limitations which I mentioned just now. Taking it on merits, I would certainly agree with that in principle; but I do not mean, again, to reflect on the immediate problem which arises in the present situation, with its wider issues affecting price stability.[4]

[1] App. 11, p. 146. These differ slightly from the Inland Revenue's periods, because the latter use a less refined breakdown of assets (see 230–2).

[2] First Report, 1001, pp. 144–5. [3] 330–2.

[4] 671. He had earlier argued that 'we would argue . . . that one ought to have rather wider dispersions of price. . . . Pricing could make it worth while for the Coal Board to go more slowly on sheer quantity and concentrate on digging up the types of coal particularly needed. . . . But you can well appreciate that I am talking here from a narrow point of view, and I am not touching on the wider issues that we all know about' (669).

These 'wider issues' are to be found by implication in appendix 3, p. 134, which outlines the price increases proposed by the Coal Board, with the dates and amounts in question, and the actual increases 'allowed' in fact by the government. The disgraceful affair of the 1955 election postponement is discussed from a civil servant's point of view by Sir John Maud in 320–6. It is alleged in America that the Federal Communications Commission

(c) *Wastage.* (i) The supply of coal is limited. But, though in practice the less costly coal is mined first, there is no law of nature that enjoins this; it would be perfectly possible to mine the most difficult first. A stock of coal in the ground is an asset which costs the community nothing. It involves no carrying cost, but also produces no yield, and possesses no liquidity premium. It therefore has an own-rate of interest of zero.[1] A hundred tons of coal today equals 100 tons of coal to be delivered tomorrow in terms of itself. But the prices will not be the same in a society where there is a rate of interest (or any other own-rate of interest above zero). If the rate of interest is 5 per cent., £100 today will buy £105 for delivery next year. If coal is to be 'saved' for delivery next year, £100 worth of coal must therefore also buy £105 worth of coal for delivery next year. If the price of coal for future delivery rises above this, coal will be 'saved'; if it falls below it will be used today. In equilibrium, today's price will be forced up or down so as to produce some such difference. If the rate of interest were zero, the price of coal for delivery in the future would be equal to today's price. The existence of a rate of interest therefore expands today's use of coal at the expense of tomorrow's.

The value of the coal in the earth is but a small part of the price of coal to the consumer, who also has to pay the cost of mining it. If we are right to argue that there are no geological facts that force shafts to be sunk in such a way that the cheapest coal has to be mined first (and it is difficult to see what these facts could be), the exploiter of coal seams has a choice between mining the easiest coal first and evening out his costs over time. Only in so far as the access to the coal face is necessarily through the coal seam, so that the face retreats from the pit bottom as more coal is mined,

allocates television channels on 'political' principles, while employing a large staff to justify their decisions according to an elaborate system of case law; Sir John Maud's evidence might suggest that civil servants in Britain sometimes perform a similar role. The Coal Board's view of the matter is given in 74, 77–86, and in Mr. Latham's statement that 'any Board would prefer freedom to ties of any kind, but . . . we have public responsibilities and we do not seek to evade those. From time to time we may think we ought to have more freedom than we get, but we do accept there are public responsibilities' (90).

The criteria used by the Minister in disallowing, or delaying, price increases were outlined in 262–326. The presumption was that an increase should not be granted; as put by Mr. Ayres, 'in my experience, dating back from the beginning of the Ministry of Fuel and Power, no Minister has ever been anxious to increase coal prices by more than was necessary or earlier than was necessary' (310). Increases in costs were relevant to the necessity, and considerations of the accumulated deficit and the needs of self-financing came second. Economic questions such as those raised by the Ridley Report were left undecided in the Ministry (278 f.); 'I remember one Minister of Fuel and Power in the House referring at the time of a price increase to that tremendous economy measure, but I do not think he meant by that that we have consciously thought that in order to increase fuel efficiency it was important to put up prices' (281, Sir John Maud). See, however, later on oil, p. 260 n. 1.

Mr. Grant, however, had stated earlier: 'It certainly would not be a Treasury decision to refuse an increase in prices, because the Treasury's interest is to keep down the amount of money it is putting out in the industry' (First Report, 23).

[1] J. M. Keynes, *General Theory*, pp. 225 ff.

would it seem to be a natural fact that costs of mining rise over time. Other reasons given for deterioration of present conditions of mining (the depth of workings, thinner seams, reworking abandoned seams, &c.),[1] are the result of past patterns of preference for cheap coal. This choice of cheap mining today at the expense of dearer mining tomorrow is indeed quite proper in a world where there is a rate of interest. Today's profits are worth more than tomorrow's, and tomorrow's costs are less serious than today's. Any operator naturally responds to the uncertainties of the future by mining as cheaply as possible today. It is not therefore an unfortunate hangover from the past, but a basic fact about a coal industry (whether managed by private enterprise, or by a nationalized board) that it is operated in such a way that costs rise over time.[2] (This could admittedly be offset by the continuous discovery of richer seams of coal, or by faster technical progress than in other industries; but these do not seem to have happened.)[3]

It may be argued that the public interest requires that we should not discount the future in this way, but that we should allow for the timeless interest of society. The more we approximate to this (the lower, that is to say, we account the rate of interest), the more valuable today becomes coal saved for delivery tomorrow, and the less will we be tempted to mine cheap coal today at the expense of tomorrow's consumers. For the cost of mining a given piece of coal today is the loss of the opportunity tomorrow. We will then raise today's prices to equality with tomorrow's costs of mining.

As against such 'conservationist' measures, it can reasonably be argued that we do not know for certain the amount of coal that will be available tomorrow, as new reserves are continually being discovered. At the same time, as technical progress continues and more substitutes for coal are discovered (as well as ways of saving coal), we may expect a falling demand curve for coal. If coal tomorrow is worth less than coal today, it is certainly not worth while saving today's stock of coal.

In practice, the net effect of these factors is that the industry works at increasing costs over time with, *ceteris paribus*, a long-run falling demand curve. Other things being equal, one would expect supply to contract.

[1] First Report, 924–30.

[2] Sir John Maud therefore seems to have been unnecessarily gloomy in asserting: 'It is a gloomy fact that, over the whole of the last 100 years, coal prices have gone up in relation to other prices. Whether that is a factor only in Britain I do not know; but it is a very important background fact that, for geographical and social reasons, that has been so' (315). It is, however, rather an economic fact. Naturally it appears to present-day operators as a worsening of physical conditions.

[3] Storage costs prevent profitable arbitrage between today's and tomorrow's coal. It may well be that imperfections in the market for coal royalties encouraged an uneconomic pattern of exploitation in the past.

But in the post-war world this was offset by the income effect of rising production, so as to produce a slowly rising total demand for coal (in terms of the British internal market).[1]

It is therefore proper that the cheaper coal should be mined today, but some account should be taken of the future rise in costs. In so far as royalties paid to the owners of coal form part of the compensation stock on which interest has to be paid by the N.C.B., some slight account is indeed taken of this factor.

(ii) There is a further sense in which investment in the coal industry is in a wasting asset. The sinking of a pit and tunnelling to the seams are forms of investment that produce no output at all after a certain date, but, during the period in which output occurs, these investments may not suffer from wear and tear. They are similar to a patent which has a monopoly value for a limited time. It would seem reasonable that they should be depreciated over their life in terms of the cost of sinking a similar pit at present-day prices.

The actual position is that productive capacity would fall by 40 million tons in 10 years, or about 4 million tons a year, if investment were restricted to depreciation provisions at historical cost (about £45 million per year), and by about 30 million in 10 years, with investment at the level of depreciation at current costs, (about £60 million per year). The reason given for this is that 'the capital invested in new and reconstructed pits is much greater per ton of annual output than the investment in pits which are becoming exhausted or are losing output, even when that investment is adjusted to current prices'.[2] or that 'these easily gettable

[1] Until 1956. The decline since then has been partly due to industrial stagnation, but also reflects a shift to electricity and oil (see *Economic Trends*, May 1959).

[2] See appendix 2, p. 133, the first estimate, based on *Investing in Coal*. The figures include ancillaries as well as collieries, and are somewhat hypothetical, as they ignore existing commitments for major schemes, and would require a complete reworking of investment schemes for particular collieries and coalfields. 'If the Board's capital investment were to be limited to £60 million a year, it would be impossible to carry out the programme theoretically most likely to minimise the loss of capacity.'

There seems to have been some confusion in the evidence given verbally, before the Coal Board put in a memorandum on the point. Mr. Schumacher referred to 'replacement in the same sense as in manufacturing industries' absorbing £30 million a year, so that 'out of £60 million a year you would have something left over for replacement of capacity'. He referred to big schemes, costing £550 million, of which 'something of the order of £400 million, will have to be spent just for the replacement of capacity' (i.e. '283 pits which will have gone out'). 'The £550 millions, in terms of capacity, roughly equal about 50 million tons capacity. And if £550 millions is 50 million tons then £300 millions is a matter of 25 million tons'. With investment at £600 millions in ten years, (i.e. £300 million net of machinery replacement) 'we would still be something like £100 millions or £150 millions short for maintaining capacity . . . a matter of about 15 million tons' (First Report, 1170—84).

This is a more optimistic estimate than that given later. Mr. Schumacher's argument was that over 10 years with no investment in capacity (i.e. with total investment of £300 million to allow for machinery depreciation), capacity would fall by 40 million tons, which could be made up by investment of £400 million. On the other hand, the later figures given

resources are no longer available'.[1] It would seem that, of the £60 million a year depreciation at replacement cost, £30 million represent machinery, &c., and £30 million the replacement cost of the old capacity.[2] It is thus not at all clear that current consumers should provide more depreciation out of current prices than the £60 million. If depreciation were charged at £70–75 million (to allow for the maintenance of output at the old level, according to Mr. Schumacher's estimates), it would seem to be equivalent to implying a zero rate of interest.

On this point, Mr. Grant, as shown in the earlier quotation, seemed ready to take the extreme view, perhaps because of the ambiguity of the concept of 'maintenance of production'.[3] The Select Committee themselves were more cautious, as usual:

> Your Committee do not wish to discuss what is the proper basis of depreciation for an extractive industry. But it seems to them wrong that the Board should have to make large annual demands on the general body of the nation's savings to pay for the level of investment which is essential merely to maintain output of coal. This requirement would better be met by the consumer out of the price paid for coal.[4]

In effect this policy would have involved financing at least the whole investment programme out of current revenue.[5]

II

Before turning to discussion of the actual criteria used by the Coal Board, it is necessary to consider some of the difficulties in applying the normal marginal criteria to the case of coal, though they are perhaps no more difficult than in the case of many other industries.

In the case of any given pit, the Coal Board is faced with the following alternatives:

1. To close the pit.
2. To keep it open without any net investment, in the sense that

above suggest a decline in capacity of 40 million tons even with capacity investment of £150 million. With capacity investment at £300 million, the respective shortfalls would be 15 and 30 million tons. The later figures imply that capacity would fall by about 55 million tons with no investment, in contrast to Schumacher's 40 millions, and that to replace this would cost £550 million rather than £400 million. (It would seem that Schumacher ignored capacity depreciation at historical cost (£150 million) in his calculations.)

[1] I. 1177.

[2] Mr. Schumacher's evidence (I. 1170–84).

[3] 671, quoted on p. 243.

[4] P. xvi.

[5] As shown earlier (I. 1001), investment since 1952 was running £150 million above replacement depreciation, which is the same as Mr. Schumacher's deficiency (I. 1170–84).

Professor Dennison thinks the extreme view is 'right', because the consumer should pay for investment to 'maintain output of coal', and defends this by reference to the Herbert Committee. But he seems to be unaware of the special problem of coal outlined above ('Investment in the Nationalized Industries', *Manchester Statistical Society*, 11 Feb. 1959, p. 13). This paper, which came to hand after this was written, agrees on many points.

existing machinery and plant is maintained in good repair or replaced when it wears out, but that no further investment takes place.

3. Further investment may take place. This may be compared with various standards of depreciation:

(*a*) Investment may take place up to the limits of the replacement cost of the original capital sunk in the pit. (This would be covered out of current prices, if a proper pricing policy were followed.)

(*b*) Investment may take place that is just sufficient to maintain output. We assume that, as argued earlier, the industry is faced with a rising cost curve over time for a given output (and also with a rising cost curve at any given time for expansion of output). This rising cost may perhaps be simply envisaged in terms of a constant labour and machinery cost per unit of output, with a greater capital requirement; without the extra capital investment, it is impossible to maintain output (new pits have to be sunk, new seams opened up, &c.). Thus the additional capital investment in no way prevents costs from rising.

(*c*) Further investment may take place, that either increases output beyond this point, or reduces cost for a given output. (In practice, though these decisions apply to the industry as a whole, they may not at all apply to any given pit or set of pits. Investment may be required in lumps, so that the only practicable choice may be between, say, 1 and 3 (*c*).)

For decision, information is required about

(*a*) the present demand schedule for coal;

(*b*) the future demand schedule;

(*c*) out-of-pocket costs, including machinery wear and tear;

(*d*) user cost in the sense of loss of scrap value that results from producing rather than closing down, in the case of machinery that cannot be used in another pit;

(*e*) the rate at which costs rise for the industry as a whole if output is maintained at the present level, (which can be expressed in terms of investment required to maintain output). In so far as we may conceive of this investment as bringing into use new seams or pits (and this may be the case whether it comes under 3 (*a*), (*b*), or (*c*)), it can be expressed in terms of investment cost per ton, (as is frequently done in the evidence to the Select Committee);

(*f*) the rate at which costs rise in the particular pit in question, with various levels of investment.

For the industry as a whole, if output is to be maintained (or increased), it must be assumed that the demand schedule moves upwards at least as fast as the cost curve. The Coal Board investment plans (to be rational) would have had to assume that the demand curve was rising faster than

the cost curve—a not unreasonable assumption given a fairly high income elasticity of demand for coal and a general policy of industrial expansion. It might be fairer today to make an assumption of more or less constant, or slowly falling, output. As we are concerned with criteria, and not with judging an actual investment programme, it does not matter, and it is simpler to talk in terms of maintaining a constant output with rising costs, as investment cost per ton rises with time, and thus to assume a demand curve rising over time to match it.

The proper policy for any given pit would then be to close it down if it cannot cover current labour and raw materials cost plus wear and tear cost of machinery that can be withdrawn from the pit and used elsewhere, plus user cost of other machinery with scrap value. But this has to be looked at over time. It is possible to conceive of a situation, where a pit is making losses at the moment, but where it can continue to produce at the same cost for a period, during which we assume rising cost (and prices) in the industry as a whole. It may therefore be that production should not cease. No doubt future profits must be discounted in terms of the appropriate rate of interest, but it clearly cannot be said unambiguously that a unit that does not pay today must be closed down, using the current cost principle. Similarly, it is always reasonable to suffer losses to maintain a labour force, if in the longer run the unit can be made profitable by further investment or some other measure.[1]

But we have ignored the rate of interest. It is quite unambiguous to talk about the capital cost required to maintain output, or the capital cost per ton of new capacity (suitably defined). But before we can state the cost per ton in the ordinary sense to compare with the demand schedule we must know the relevant rate of interest. If, with a given rate of interest, the demand curve rises at just the same rate as the cost curve, so that output is maintained over time, there must be some interest rate at which the cost curve would rise faster than the demand curve, so that output would fall (and vice versa some interest rate at which it would rise,

[1] e.g. 'With some uneconomic collieries we have kept them open rather longer than we would have hoped to do to maintain the labour force. If we had a development which might be requiring men in a few years' time, we would keep the colliery open to keep the labour force together' (Mr. Latham, 222). 'Before you close down a pit you have obviously got to consider whether the capacity of that pit is something which you may not in fact need at a later stage of whatever assumption you are making about increase in the economy and therefore increase in the demand for fuel' (329). 'Quite frequently a colliery runs into a bad patch and does incur heavy losses for a time, and yet is kept going through those losses' (571). Five categories are later mentioned: 'heavy losers at the time because of reconstruction work . . . new pits which are just getting coal on a very small scale . . . pits which are going to continue without major reconstruction . . . a number of short-life pits . . . in some districts collieries are subject to very rapid fluctuations in results, particularly small collieries' (840). (See also 843, 879, and 905–6, the last on the uneconomic pits producing anthracite or carbonization coal, 'both in short supply', and Report, paras. 112–23.)

though only within a certain range in so far as we are dealing with rates that may fall only to zero). It may be that the price-elasticity of demand for coal is so low, and the importance of any likely change in interest rates so relatively small in relation to other costs, that it makes no difference in practice.[1] If a proper policy were followed, it would be important to see that the return to investment schemes were more like the 10 to 20 per cent. expected in private enterprise, or at least more than the 4 to 6 per cent. post-war yield on gilt-edged.[2] Let us assume that it is in terms of such an interest rate that we can expect output to be maintained over time.

This assumed rate of interest should be the minimal rate of return on any project, in so far as there is a spread of yields to investment. Obvious waste of capital would follow if it were argued that the average return to investment schemes would be say 15 per cent., but that this involved some schemes having a return of 40 per cent., and others with a zero, or negative return. But it is precisely this that is likely to be approved by the Ministry of Fuel and the Treasury, according to the evidence given by them. They are apparently little interested in seeing that every particular investment scheme earns at least a minimal return. (Averaging is, of course, entirely reasonable over a whole scheme for pit reconstruction; even though it may be separable for some purposes into separate bits and pieces.) The criterion of a minimum rate of return must be applied to each particular investment scheme, whether it is a case of reinvesting depreciation funds or further investment (3 (*a*), (*b*), or (*c*)).

The next complication that must be introduced is the situation when marginal cost pricing is not applied, but costs are averaged. This is, of course, in principle likely to lead to waste, with demand artificially increased. It has been argued that as a result investment schemes have been excessively expanded. It may be that in practice because of the low elasticity of demand for coal, and the existence of rationing, little damage in the past has been done through excessive output. It is not the place to argue the matter here. It may also be the case that the shortage of technicians has prevented a similar excess in investment expenditure. But it is with the difficulties of providing a proper criterion that we are concerned.

[1] In fact, studies have suggested that the elasticity of demand for coal is rather low (see K. S. Lomax, 'The Demand for Coal in Great Britain', *Oxford Economic Papers*, Feb. 1952). Interest charges in 1957 represented 2·8 per cent. of total Coal Board receipts, so that even a doubling could not make much difference.

[2] See S. P. Chambers, 'Investment and Britain's Industrial Future' (*The Listener*, 24 Jan. 1957). 'A project which yields less than about 12½ per cent. profit on the capital employed would generally be regarded as wholly unattractive and barely able to pay a reasonable dividend without any margin for reserves. If it is safe to rely upon fixed interest loans the interest cost will be substantially below the cost in dividends and profits tax of equity capital, but this form of finance is suitable only for products for which the demand and the prices are likely to be steady over a period of years.'

We can no longer assume that pits making a loss on our principles must be closed down. If in fact the level of output is correct (according to our marginal cost principles), though the price is artificially low,[1] there will be many pits making a loss. Many of these would not be making losses if marginal cost pricing were used. Some, at the bottom of the scale, may be kept open because their cost curves will not rise as fast as the average. Others may have good investment prospects, though incurring large present losses. (Future prospects may differ considerably from present returns, and high investment returns may not be matched by high present returns. With an industry where geology determines costs, there is no necessary correlation between present and future profits.)

All this produces complications, but the principle of maximizing returns to capital still holds. We have, as always, to compare what happens as a result of a given capital investment with what would happen otherwise. If it is assumed to be reasonable to keep open a pit, even though it makes current losses, the relevant criterion is the difference between the losses made if no investment takes place and the reduction in losses (or actual profits) that occur as a result of investment. But both these must be taken over time. One way of looking at this would be to add a premium to present prices to allow for their being unduly low. If this is not done, or if cutting down of current losses is not counted as part of the return on investment, then particular investment schemes will not look as fruitful as they really are.[2] It may be that investment has been pitched unduly low for this reason in the nationalized industries, and it may have offset the expansive effects of low prices and of cheap money. Cheap money for the nationalized industries is logical if their prices are kept low. It is thus wrong to conclude dogmatically, as has sometimes been done, that too low prices inevitably lead to excessive investment.[3]

A further difficulty is introduced if the rise in costs over time is neglected. The Coal Board seem to have hamstrung themselves in their development

[1] This may have been not so far from the truth in the post-war period, with rationing, and a low elasticity of demand.

[2] If the return on investment is averaged over all investment, which seems to fit in with average cost pricing, then indeed there will be a larger investment programme than with marginal cost pricing. But if each investment scheme still has to earn its keep, then the lower price will make certain schemes unprofitable, which might pay with marginal cost pricing.

[3] e.g. Dennison, op. cit., p. 14: 'On both counts, the level of demand and the level of costs, the arrangements of the nationalized industries introduce a bias in favour of ambitious investment programmes.' He is also unduly critical of the Board in relation to comparisons with marginal cost pricing when he says: 'The Board's formulation completely ignores the fact that a change to marginal cost pricing would bring about a new equilibrium of demand and supply, and that this would involve a shifting of the margin, a reassessment of the relative profitabilities of the different collieries and therefore of investment plans' (pp. 15–16). One may wonder if the change would be all that great.

plans by assuming both current prices and an enlarged total demand at their target date.[1]

III

We now turn to discuss in detail the investment criteria that are actually used in the case of coal.

1. *The physical output criterion*

Coal Board investment is primarily based on 'the basic plan that the Government have agreed that our objective should be 240 million tons in 1965'.[2] This target was originally set in the 1950 *Plan for Coal*, which based its investment schemes on the estimate

> that they will be able to dispose of between 230 and 250 million tons a year at home and abroad in the period 1961–65. . . . To simplify the calculations that had to be made, the Plan has been based on an output midway between these limits—240 million tons. In drawing their conclusions the Board have had to bear in mind that the future output may have to be substantially more or less than 240 million tons a year.[3]

The revised plan *Investing in Coal* (dated April 1956)

> provides for an output of coal from all sources—including opencast—of 228 million tons in 1960 and 240 million tons in 1965. The Board have come to the conclusion that an output of 250 million tons a year cannot be attained before 1970 instead of in 1965 as they hoped when they made their *ad hoc* review.[4]

This target seems to have been based on the overall demand for fuel and the expected trends in demand for oil and supply of atomic energy for power stations. Though the revised plan quoted the earlier reference to 'a series of circular arguments. Thus the future demand for coal depends on price. . .'[5] it does not seem to have paid much attention to it. 'Even in the longer term the problems of over-production for the coal industry can scarcely arise.'[6] But already by February 1958, Mr. Latham was saying:

> We aimed at 240 million tons in 1965, and we were not then assessing the demand in 1965 as a limit of 240 million. We thought that was the best we could do to meet the demand . . . . So that what, in very crude terms, I would say we have done is to come back more nearly to a demand of 240 million tons than we were in 1955 . . . . I think it is an extraordinarily difficult moment to forecast the level of economic activity in the country as a whole, and therefore the country's energy needs. . . . One feels there is a fluid situation and that the 240 million tons is looking more nearly like a total demand for coal than it did in 1955.[7]

[1] See Report, para. 21. [2] 531.
[3] *Plan for Coal* (National Coal Board, Oct. 1950), para. 15.
[4] *Investing in Coal: Progress and Prospects under the Plan for Coal* (National Coal Board, April 1956), p. 14.
[5] Ibid., p. 7, quoting *Plan for Coal*, para. 156. [6] Ibid., p. 13.
[7] 519, 523.

By December 1958 Sir James Bowman was writing:

> The policy of going all out for the last ton served the nation's purpose at the time. We are well aware that it is no longer necessary. There must be a complete change of emphasis. We can now concentrate on competitive efficiency.[1]

In the same month the Parliamentary Secretary of the Ministry of Power was arguing that increases in coal prices had priced coal out of certain markets, and that no general increases in coal prices could be contemplated.[2]

If investment plans are based on an output target, it is natural to look at the investment cost in relation to the extra tons produced (over what would be the case otherwise). Hence arise the average figures of investment cost per ton, quoted at intervals in the evidence. The yardstick of £10–12 per annual ton of capacity seems to be one that is used to check investment plans. Granted a rough averaging approach, it seems reasonable enough.[3] Inquiry then turns on cases where it is grossly exceeded.

It is worth commenting, however, on the way realism is dissipated by the irruption of the concept of 'needs', as in Mr. Latham's evidence quoted above.

'The country's energy needs', quoted above, may be pardonable, but at other times the misleading moral and social connotations of the word (by contrast with 'wants' or 'demands') are implicitly applied to coal and particular brands of coal, as if the 'need' for coal could be assessed in the way diets can be judged in terms of calories and vitamins, or housing requirements in terms of a given number of rooms for a family of a given size and composition. Thus Mr. Latham on the costly anthracite pits in South Wales:

> Our heaviest losses, I suppose, have been in the anthracite district in South Wales where we have to meet the demand for anthracite. Conditions are very difficult indeed, and we have some pits with heavy losses. We are investing in two big pits there which we hope will enable us to eliminate those losing collieries, but meantime we are carrying them on because we can see no alternative way of filling the country's need for anthracite.[4]

It is a little difficult to believe that the demand for anthracite is completely inelastic and that no substitution can take place between it and other kinds of coal. Nor would there be anything to prevent anthracite consumers bearing the losses on anthracite, in so far as anthracite has a more clearly defined market and more clearly defined supply conditions

[1] *The Times*, 11 Dec., 1958.
[2] Debate in House of Commons on 3 Dec. 1958. Total demand for coal was 228 million tons in 1956, 221 in 1957, and 208 in 1958.
[3] See Bowman, First Report, 923; Grant, First Report, 143–5, Second Report, 666; Ayres, 45. [4] 545.

than other kinds of coal.[1] This being so, it is difficult to attach any meaning to 'the country's need for anthracite'. Or is this a polite way of saying that certain vested interests who have been subsidized by the general coal consumer must not be offended, because they would be annoyed if they were made to pay for what they consume?

Mr. R. J. Ayres, a Deputy Secretary, Ministry of Power, who gave evidence with Sir John Maud, the Permanent Secretary, gave a similar reply in answer to a question about whether the Minister would have power to give a direction to the Coal Board telling them to close an uneconomic pit, that 'it is not only a matter of achieving economy, there is also the matter of supplying the public of this country with their needs in the way of coal. That is just one of the questions that would arise if you shut down pits.'[2]

Connected with this is the 'public service' conception of a nationalized industry. This is a view apparently held by the Treasury, as well as by the public at large. As Mr. Grant put it:

> I think the nationalised industries all have to have regard to the public interest in one form or another. . . . Although we call them 'nationalised industries', in fact they are very much nationalised public services. They are not industries in the way that the Renault works in France are a nationalised industry; as in the case of water undertakings, and so on, there comes a stage of importance when somebody has to intervene to some degree or other on prices [and he went on to refer to iron and steel and bus services].[3]

It is difficult to see how any rational investment policy can be devised for fuel, unless some assumptions are made about demand conditions, and pricing policy. Output targets in fact imply some such assumptions, which may clearly be inconsistent with other targets unless the assumptions are brought out into the open. It is impossible to believe that there is complete inelasticity in the demand for coal, when oil and electricity are, within limits, substitutes. To that extent, the price policy which consistently kept coal prices below a demand-supply price (which would have enabled coal to be unrationed) and below a marginal-pit cost price may have led to excessive estimates of future demand. But it would be absurd to criticize the failure of estimates, which is no more than might be expected in an unpredictable world. What can be criticized is the failure to bring out into the open the irrationality of investment policies based (implicitly) on artificially low prices, such prices having been kept artificially low, not because of any long-term policy to subsidize the use of

[1] A policy of 'averaging the price of coal' is quite compatible with a policy of averaging the prices of all particular kinds of coal, in so far as they are produced at independent pits. In fact, coal is not at all a homogeneous commodity, and such averaging would be very advantageous in contrast to an overall average price, which takes little account of differences in kinds of coal. The widening of the concertina of coal prices is a step in the right direction.

[2] 66. [3] 687, 689.

coal on some general social or economic grounds, but merely because of the political inconvenience of raising coal prices.[1]

One can appreciate Sir James Bowman's irritation:

> This kind of half world in which we live as the National Coal Board. What are we? We are not flesh, fish or good red herring. We are not a commercial undertaking; we are not a public service; we are a bit of each. It is all right. We are prepared, as the National Coal Board, to accept all the responsibilities . . ., but what we do object to is that, having done this, there is such a complete misrepresentation of the facts. So it would not be a bad thing if you were just to say to the Coal Board—and how I would welcome it!—'From now on, you are free to act as a commercial concern'. Then I think we might be able to show some rather different results. But full employment might suffer, and British industry would not be subsidised with the price of coal at the level it is at the moment compared with what we can get abroad. However, if we are to act as a public service, let it be quite clear that we are such; and that we are not going from time to time to be tripped up as attempts are made to trip us up, in relation to our balance sheet.[2]

2. *Covering costs*

Though not explicitly outlined, the criterion of covering accounting costs seems to lie behind a good deal of the discussion of investment by the Coal Board and the Ministry of Fuel and Power. It comes most obviously to the front in the Treasury's concern to avoid having to provide finance to meet losses. It is not the only criterion applied by Mr. Grant, but it appears to be a not unimportant one.

The most obvious case of this criterion is in his remark, previously quoted, that 'the Treasury's interest is to keep down the amount of money it is putting out in the industry'. But it came out also in his obvious reluctance about the government policy of price-freeze for the nationalized industries in June 1956.

> I do not want to suggest that we felt really completely happy about it from the rather narrow accounting angle with which I am concerned. . . . From my narrow parochial point of view, it is very unfortunate if something comes along which stops me pressing my particular line, which is that you must cover costs as far as you can and must have very good reasons for not covering costs.[3]

Later, when asked whether he was more concerned with the inflationary effects of the industries' policies in having deficits which might involve

[1] See earlier p. 248 n. 4. There is, however, some evidence that the Ministry of Fuel and Power were sensitive to the long-run position of coal in relation to oil and other forms of energy, and therefore desired to keep the price down to maintain the long-run position of the industry (284, 292–305; cf. also 792–804). Thus Sir John Maud could say, more or less in the same breath, 'in the case of coal you have a complete monopoly of an absolutely basic commodity entering into so many other parts of industry' (271) and 'I think I would have had in mind particularly the importance of coal not pricing itself out of certain markets; and not only coal but the derivatives of coal, particularly gas, in competition with oil' (284).

[2] First Report, 911, p. 128. The Select Committee commented that 'in reviewing the past and the 1956 Report it is right to treat them as a hybrid—part-business and part-public service' but 'for later periods. . . . Your Committee have . . . given full weight to commercial and economic considerations' (para. 9).

[3] First Report, 94, 98.

a call on public funds, or 'the efficient management of the Boards', he replied: 'I should say that the emphasis was on the former. Each year we want to know what the scale of investment expenditure is, and what their surplus is likely to be and what the net amounts are.'[1] On the other hand, this did not prevent him being concerned with the long-run planning point of view as to shortage of power stations in the future or the inadequacies of the railway investment programme,[2] or from questioning depreciation policy.[3]

3. *Yield on capital*

In so far as the yield on capital comes into question, it only seems to do so in a limited kind of way. Again and again the members of the Select Committee asked the representatives of the Ministry how far they expected a given return on the capital invested and whether they checked to see that investment plans were devised to produce that return. The answer they got was very revealing. It was that the Ministry had no technical experts to check the Coal Board's experts, did not think it necessary or desirable to have them, and, though they obtained details of the major schemes, and discussed them with the Board, they expected that the Board would have found the cheapest way to produce a given quantity of coal. They did however consider the average capital cost of producing the planned output, and would be told of cases where the investment cost was much above average.[4]

Examples of this Alice in Wonderland form of dialogue are as follows:

Mr. Ernest Davies. There must be some financial test. . . . Do you look at the actual returns which you receive from the investments before you give the authority for that investment? *Mr. Ayres.* Not pit by pit. (Q.) You do not apply any financial test, as it were, to the investment that is made? . . . *Sir John Maud.* I think we ought to be quite frank. We really do not check the technical wisdom of the Board in proposing this investment for the various collieries. We could only do that by looking at it pit by pit and you cannot do it in general.[5] *Sir John Maud.* I do not think it would be true to say that we merely look at an investment programme from the point of view of how much coal it will produce; and the various averages in terms of capital to be invested in order to produce one ton of coal are some sort of guide to what is right; and we, as of course the Coal Board, have a very strong interest in not wasting money on any investments where the money could have been invested better in some other pit, or not at all. *Chairman.* So you get the financial details from them. . . . *Sir John Maud.* Our hope is to do that. *Mr. Ayres.* Over the whole field, yes, but not project by project. . . . *Chairman.* What I cannot understand is, what is the objection from the financial point of view to getting

[1] First Report, 110. [2] Ibid., 123–32. [3] Ibid., 133–42.

[4] See, for example, First Report, 143–8.

[5] 46–48, also 49–64. 'What I am convinced is that, if there is this extreme case where there is on the face of it very uneconomic investment, that would be brought to our attention, but not because we, as it were, scrutinised and elicited from an unwilling Board these disagreeable facts' (Sir John Maud, 56).

the financial details of each investment, even in each pit? It might cause you to have one or two more men to look at that, but not technical men. . . . *Sir Keith Joseph*. . . . Why, therefore, do you not arrange for a list not only of the cost but of the expected output, and therefore the cost per ton? *Sir John Maud*. Because I do not think it would do any good. *Mr. Ayres*. . . . We approach it from the angle, first of all, of: what is the requirement of coal; and secondly, what is the average capital cost of getting that coal; and we rely on the Board, there is no doubt about it, to select the cheapest way of getting that quantity of coal. . . . *Chairman*. . . . You seek to replace the discipline of the market by discussions between yourself and the Coal Board. The Coal Board are not subject to the discipline of the interest rates in the market. . . . I cannot see why. . . you do not put them through the discipline of having to explain to you why it is that they wish to get new money to spend on a particular project which they know costs rather more than the expected cost of producing new coal? *Sir John Maud*. I do not think there is any answer, except that we have asked ourselves precisely the question that you have just put, and so far we have found that the answer was that, on balance, it would not be worth while.[1]

The chairman in this was in fact echoing what Sir John Maud had earlier said about the rate of interest. Sir Alexander Spearman had asked a question about the effect of the rate of interest in encouraging or discouraging forms of investment bringing in quick or slow returns according to the state of the economy, and Sir John Maud had replied in terms of long-term plans for output and broad figures of sums invested and how these broad plans were altered according to the state of the economy. He was then pressed:

(Q.) The rate of interest does not affect it?—The place of the rate of interest in the private sector is taken by this quite direct responsibility that Her Majesty's Government takes in the public sector, exercised through my Minister with the Chancellor.[2]

If the Ministry of Fuel and Power were naïve about the rate of interest and the return on capital, what about the Treasury? On the whole, it seems to have accepted also the same 'broad financial test, namely the average profitability that was expected to come out of a new investment'.[3]

We used to ask questions about: 'What sort of pits have you which are running at a loss? And what is the scale of the loss?', and questions of that kind. I do not think we have examined any details of new long-term investment proposals and what the return would be.[4]

But Mr. Grant gave a more rational explanation of this attitude in terms of the overriding need for more output, and stressed that 'a much closer sense of calculation will come in as soon as you assume that the coal crisis of the old style is out of the way'.[5] The assumption was that any investment in fact could expect to earn a proper return as long as there

[1] 341–5; see also 346–54. [2] 43–44. [3] 624–39.
[4] 630. [5] 625.

was such a shortage of coal. The 1947 fuel crisis clearly had had a traumatic effect on the Treasury.[1]

> In the case of coal, I think constantly our worry has been too little investment, and not too much. Coal has had, since 1947 at any rate, all the money it really could justify. . . . But we have let capital go into coal, I think, as compared with other forms of fuel and power expenditure, and you can justify the return many times over, if it comes off. . . . (Q.) Would you say that there has been rather under-investment in the coal industry since the war rather than too much investment? —Yes. . . They say it is shortage of technicians. We have had the feeling not only that they could have invested more, but that their investment might be speeded up and come to a successful conclusion rather more quickly.[2]

The Committee commented on this evidence as follows:

> They have to convince the Ministry and the Treasury that the money will be well spent. The discussions to this end are based on the average figure of the yields expected from the investments planned for the coming year. . . . The Ministry . . . are not formally told, for instance, of the minimum yield that can be expected from the individual schemes being considered (although the point might emerge during the discussions); it is purely an *average* figure that is discussed. . . . It seems clear to Your Committee that an average figure . . . is unlikely to give sufficient information to the Ministry to enable them to judge the proposals for borrowing which are put to them.[3]
>
> If these discussions with the Ministry are meant to replace the negotiations for raising money on the market, there is a strong case for making the two as nearly equivalent as possible; and Your Committee question whether any private borrower without a firm record of profitable investment could expect to raise money at regular intervals without giving fuller details than the Board at present give the Ministry. Following this line of argument, the Ministry should not try to make a full technical appraisal of the proposals but they should apply an economic test, and should demand the information necessary to do so. . . . The Ministry should at least make a greater financial check on the anticipated return on money they lend than they do at present. . . . Your Committee therefore recommend that a change should be made, and that the Board should present the Ministry each year, not only with the average yield expected from the total investment, but also an account of the major schemes estimated to give the lowest yield, and the reasons why those schemes are put forward.[4]

In fact the Coal Board seem to have paid rather more attention to the return on capital than either the Ministry or Treasury. Mr. Latham gave a good deal of evidence on this point:

> All assessments for capital investment, all assessments for possible schemes, do take into account the full interest charges on the money required. . . . We are seeking the best way with the given resources of satisfying that requirement. . . . The test is financial, but it is a financial test of alternatives in essence. . . .[5]
>
> Any project involving capital investment has to show an economic return better than some alternative, and that is where the bank rate is so important.[6]

The difficulty arises because the basis of the investment plan is a given output target of 240 million tons, and a given price level (apparently

[1] 638. [2] 661–4. [3] Paras. 25–27. [4] Ibid., 30–33.
[5] 124, and see the whole discussion (124–59); also First Report, 1014–18. [6] 159.

taken at present levels, both in relation to factor costs and to market prices).[1]

We must begin with the basic plan. . . . Our objective is, obviously, to produce that coal in the places in which it is required at the cheapest cost in terms of production and transport. . . . We use the present price level for those relationships which are the key to the financial yield.[2]

On the output required to meet the target of 240 million tons, we have at the present time a price level on which we are seeking to make ends meet. . . . We have a range of yields, but the projects are within a range of yields; they are not showing losses. We are not approving projects on which we expect from the first moment to lose money.[3]

There is no specific figure quoted (of a minimum yield). . . . It is the alternative test all the time, that carrying on that colliery, say losing half a crown a ton, is still the cheapest way to the country of providing that coal.[4]

What the yield in the end will be will depend on price level which that Government in fact approves (when the target of 240 million tons is met in the cheapest possible way).[5]

It would be quite inappropriate in an industry in which, say, in the East Midlands large profits are being earned in pit after pit and most of the capital they are spending is bringing in a huge yield, whereas in South Wales it is extremely difficult to find a proposition with a satisfactory yield; it would be most inappropriate to have one firm fixed percentage.[6]

We are constantly rejecting projects at all stages, from a half sheet of notepaper to a completed project, because on examination the economics are unsatisfactory. . . . We have always been able to fill their place with other projects so as to make up the total we were working for.[7]

All these remarks might be better interpreted in terms of our second criterion of covering costs, taking account of the given interest rate and average yields, as well as the average cost pricing policy. In practice the Coal Board seems to use a more respectable method of looking at yields, respectable at least in the sense that yields are compared, though, as we shall see, the way yields are measured is somewhat odd.

In a detailed memorandum,[8] the Coal Board explained how they estimated yields on two different bases, the first 'by taking the estimated profit as a percentage of total investment, including the book value of the colliery as it exists', the second 'the return on *new* capital, calculated by taking the expected improvement in financial results, as compared with present results. This usually understates the yield, since present results could not be maintained without capital investment.' They give examples of schemes approved in 1956, which on Basis A showed yields varying from 38·1 per cent. to 6·6 per cent., and on Basis B from 43·7

[1] There is an exception to the latter point in relation to certain types of coal, e.g. coking coal, where 'we would say this is a coal where in our judgment the relative price is likely to fall or to rise over the years and it is either a bull point or a bear point on the investments' (140). In fact for coking coal it is taken to be a bull point.

[2] 531–2, and see the whole discussion (530–50). [3] 537. [4] 549–50.

[5] 562; see 557–63. [6] 600; see 590–602. [7] 142–3.

[8] Appendix 16, pp. 153–4, and also appendix 21, pp. 157–9.

per cent. to 4·5 per cent. But the anomaly of the situation is that colliery *X* with the lowest yield on Basis A had the highest on Basis B, while the colliery with the lowest yield on Basis B had a yield of 19·7 per cent. on Basis A.

Whereas Basis A seems to have no economic justification at least at first sight, Basis B seems odd when applied, as in the extreme case quoted above, to a colliery making large losses. The end of the operation, though it produces a return of 43·7 per cent., when compared with the present situation, only results in profits of £23,000 as a result of new investment expenditure of £215,000, a return of 10·7 per cent. It is only when present losses of £71,000 a year are added to the expected profits of £23,000 that a return of 43·7 per cent. is achieved. It might be thought odd to count as a return on capital what is merely enabling current costs to be covered. On the other hand, colliery *Y* is a large profitable colliery, where additional investment is needed to keep it in operation, but the additional investment only produces the meagre return of 4·5 per cent. on capital invested.

In the case of colliery *X*, we can decide nothing on the basis of present losses, except some rough idea about the advantage of closing the pit. In this case the current losses, as given by the Coal Board, involve 8*s.* 10*d.* per ton produced, which compares with the maximum Divisional loss of 7*s.* 3*d.* per ton saleable (for Scotland) and the maximum Divisional profit of 9*s.* 6*d.* (for the East Midlands) in the year 1956. But, for example, Area losses in Scotland were: 9*s.* 5*d.* in West Fife, 9*s.* 9*d.* in West Ayr, 11*s.* 9*d.* in Central West, and £1. 0*s.* 11*d.* in Alloa, for outputs of 3·6, 1·8, 2·3, and 1·5 million tons respectively, as compared with colliery *X*'s output of 161,000 tons. On present showing, with average cost pricing, it would seem reasonable to keep the pit open. In fact, the Coal Board say that if the pit were closed, 'the existing value of the colliery would have to be written off, the output would be lost and the reserves would almost certainly never be worked'.[1] These arguments seem very thin as means for deciding the issue whether to close the pit or not. The existing value of the colliery is irrelevant; it has to be written off somehow or other in any case. The fact that the reserves would never be worked is again irrelevant unless it can be shown that it will pay to work them in the future, because the trend of costs in this pit is reasonable in relation to the general trend. It is only when we know the present value of the loss of output (or the stream of income from sale of the output) as well as the trend of costs that we can make the proper judgement. The Coal Board further tells us that 'to continue without substantial capital expenditure . . . would have involved increasing losses'. This would seem to suggest that the pit would not be a strong claimant for being kept open.

[1] Appendix 16, p. 154.

The Coal Board's conclusion on the basis of this information is that in the case of the proposed investment of £215,000 to increase output from 161,000 to 215,000 tons. 'it seemed clear that the proposed scheme should be approved; it was more attractive than alternative ways of providing the coal required'. This may well be true, but is not a judgement that follows necessarily from the evidence presented. As we have seen, the net result of the operation is that profits of £23,000 (a net return of 10·7 per cent.) result in place of losses of £71,000. It may well be that this is not below the marginal yield on capital that is appropriate to all the circumstances, and that in fact no other investment scheme could earn more. It is also true that when account is taken of the fact that the real value of the coal should be counted above the average price, the yield will be much higher. To use the criterion of the 43·7 per cent. yield (based on adding present losses to future profits) is to assume that the present value of coal is such as to make the colliery break even. This may well be true, but without complete information about assumed trends in demand and cost prices we cannot make a proper judgement.

The case of colliery *Y* seems even more peculiar. It is a 'large and highly profitable colliery', which 'obviously should be kept in production at a high rate of output. This inevitably involves very substantial capital expenditure, since most of the surface equipment has to be replaced and there must be big investment underground.' It does not follow, from the fact that at the present it is making large profits, that it must be kept in existence in the future. It could be that the investment required would not yield any adequate return at all. The implication of the statement is, however, that this is not so, and in fact the figures quoted show profits rising from their present level of £481,000 to £568,000 as a result of investment of £1,919,000. To compare the difference in profits with the capital sum invested produces the low yield of 4·5 per cent., but 'for these reasons [this] yield . . . understates the marginal yield on new capital, since the existing profits could not continue without heavy capital investment'. This seems to suggest that a proper comparison would be to compare a no-profit situation with the total profits resulting from the investment. The yield would then be as high as 29·6 per cent. In fact the Coal Board produced the irrelevant comparison of the total profits after reconstruction with the new capital added to the book value of the existing capital to produce their yield of 19·7 per cent., which is lower than would be reasonable on a marginal return basis.

The Coal Board conclude that 'the two cases illustrate basic difficulties in reducing colliery investment proposals to simple statements of cost and yield'. Admittedly any comparison of what will happen over time as a result of investment with what would have happened otherwise over time,

quite apart from the difficulties resulting from average cost pricing, produces complications. But surely these complications are not impossible to illustrate fairly simply by averaging years. They do not excuse the introduction of irrelevancies such as the present book value of collieries. That in fact the Coal Board seems to use reasonable criteria is suggested by their verbal statements rather than by their figures. Thus they state:

> They have to consider whether the coal which could be won from a colliery could be obtained more cheaply from some other new investment. . . . All colliery possibilities have been assessed. Generally speaking, it is cheaper to exploit reserves from existing mines than by sinking new mines.[1]

Perhaps the most crucial statement is the following:

> The policy of setting the average coal price at the level of average cost . . . naturally affects the apparent profitability (in terms of return on total investment) on capital investment projects. Yet the Board have up to now been able to carry through their large reconstruction plans without having to include schemes (except in special cases) that failed to show a fair rate of profitability even at the level of current coal prices. The great majority of the Board's schemes, if assessed on the basis of a coal price structure paying regard to marginal production costs, would show a very high rate of profit. This is one of the reasons why it is not desirable for the Board to insist on a minimum rate of profit on schemes authorised by Divisions.[2]

It is understandable that the Board, short of technicians,[3] with an inevitably vast programme of capital spending, should be unwilling to release a large amount of information about the economic yield of their schemes. It is more disturbing that the Ministry of Fuel and the Treasury should be so loath to ask the required questions and to insist on the information being made available to them.

IV

The evidence of the Select Committee suggests a failure on the part of the responsible Ministries and the Treasury to clarify their own minds as to their proper functions. The foolishness of some parts of their evidence seems more due to this failure of hard thinking than to anything else. By spending so much time discussing inessentials, and being kept up to date with every particular crisis of the Coal Board, the responsible

[1] Appendix 16, p. 153.

[2] Appendix 21, p. 159. The Select Committee's comment was that 'if all relevant factors were included in these calculations and if the only consideration were a comparison with alternative uses of the funds available, there is no doubt that the marginal method (i.e. that based on the yield on new capital only), would be the correct one. In practice, owing to the method of depreciation used, some capital investment is generally needed just to maintain existing output, so that the marginal yield is greater than the estimates normally show. Further, the artificial fixing of an average price for coal, during a period when maximum output was considered of prime importance, renders calculations of comparative yield on capital of limited value' (Report, para. 27).

[3] First Report, 989, 1013, 1080–2.

officials no doubt did not leave themselves enough time to concentrate on these more fundamental issues.

The problems of price policy and investment criteria are very complicated for most of the nationalized industries. The best solution would no doubt be for the creation of a special committee solely concerned with laying down the general policies that the industries should follow. This solution has often been proposed, but does not seem to have been acceptable to politicians or civil servants. But, if it is not accepted, it lays a greater onus on Whitehall to concentrate on these essentials and not fritter away the time of the relatively more able administrators on holding the hands of Coal Board officials. More blame seems to rest on the Treasury for failure to engage in serious thought on the fundamental problems than on the particular Ministries, but these cannot be entirely excused.[1]

There is thus the surprising case of Mr. Kelf-Cohen whose recent book *Nationalisation in Britain* is full of criticisms of the government and the industries for their failures, many of which are most valuable and stimulating, though not all equally so. But whereas there is a chapter devoted to 'The Finances of the Nationalised Industries', there is no equivalent chapter about investment policies, which are indeed discussed in a rather random way in various places, and 'the absence of any economic yardstick in determining the size of the programmes' is rightly mentioned.[2] There is a bare reference to pricing policy, though we are told 'the Government, by every means in its power, must bring home to the Boards the necessity of studying the interests of the consumer'.[3] This is no doubt standard form in a certain type of analysis of the nationalized industries. But what is indeed surprising is to discover that Mr. Kelf-Cohen 'found

[1] Perhaps here we can refer back to *Society and Enterprise* as to how the socializing of risk-bearing might be managed. 'Society must play the part of a financier choosing between different ways of investing his money, but it must not seek to impose too rigid a form on the large and unwieldy mass of the economic structure of a modern State.... There seems to be undue preoccupation with how managing boards will be set up, and comparatively little attention to the organisation of the financing of entirely new activities' (p. 157). 'This problem can only be approached satisfactorily by drawing a rigid distinction between risk-bearing and management, by allowing risk-bearing to become a social function, and by attempting to preserve the greatest freedom in the matter of management' (p. 175). This admirable prescience about the distinction of the two functions is however blurred by a certain confusion about yields. On the one hand, 'it is a matter of distributing the volume of savings available in the directions in which they give the highest yield' (p. 163); but, on the other hand, Mr. Grant held in 1934 that future opportunities for investment were limited and asked 'would not society as a whole, apart from its members as individuals, wish to benefit a more distant posterity by increasing its wealth by adding assets whose yield might be two per cent., or even one per cent.? Even under these conditions of perfect stability the desirability of society financing enterprise through taxation suggests itself' (pp. 194–5). One wonders sometimes whether the Treasury today is not blessed with this 'wish to benefit a more distant posterity'.

[2] P. 183. [3] P. 292; see also 185–6.

himself in the ten vital years from 1945 to 1955 deeply concerned, as a Government official, with the nationalised industries'.[1]

If the proposal of the Select Committee that

> Responsibility for coal prices should be clearly and statutorily defined. When proposing alterations in coal prices, the Board should consult the Minister of Power as to the public interest but, having done so, should take full responsibility for their price determinations. The Minister should have a statutory power in the national interest to give the Board specific directions in relation to prices. Such a direction should be laid before Parliament and published, so that the Parliament and the public would be fully informed about the respective responsibilities of the Minister and the Board in a particular case.[2]

. . . If this proposal is accepted, then the way is open for the matter to be clarified. If the Ministers used open directions to lay down the main lines of policy in the matter of prices and investment, they would be forced to think the matter out, to make the relevant facts public, and enable informed opinion to judge them. Debate in the House could then be concentrated on the fundamental issues, and important decisions could not be made on political grounds under 'Gentleman's Agreements', by which open responsibility can be evaded both by civil servants and Ministers.

At the same time, the evidence of the two reports of the Select Committee suggests that they have a most valuable function to perform, if they continue to carry it out with the tact and concern for fundamentals that characterize their first two reports. But they would be greatly strengthened by the addition of a staff that could engage in some thinking and research for them and perhaps also save some of the time of the witnesses.[3]

Whatever the machinery, the fundamental matter is to see that the day-to-day trivialities of management (in which the public has little interest) are separated from the important issues of policy about prices and investment, and that adequate thought is given to the latter. At the moment it is clear that this is not done.

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[1] Publishers' blurb. [2] Report, para. 89.
[3] In their Report they leave the matter open for future discussion (para. 142).

TRENDS, CYCLES, AND STAGNATION IN U.S. MANUFACTURING SINCE 1860

By EDWARD AMES[1]

I. Introduction

INTUITION unaided might tell us that the trend for U.S. manufacturing output for the period 1915–55 gives a higher average rate of growth than one for the period 1915–40, but not, however, whether the 1955 level of output was as high as an extrapolation of the 1860–1914 trend.

Studies before the Second World War[2] spoke of a slowing down in the rate of growth of U.S. output. It is not clear whether further slowing down has occurred since then by comparison with the pre-1929 era.

Over forty years have elapsed since the First World War and it should be possible to determine whether, as some have claimed, it affected the growth of U.S. manufacturing output.

To aid in answering questions like these, a continuous index of manufacturing production for 1860–1955 (Table I) was prepared by joining together indices for shorter periods. It should be presented with some apology to those who maintain that it is nonsense to talk about an index of manufacturing output over a period so long: either it uses a single set of commodities (in which case it ignores the very important industries which have appeared or disappeared over the century); or it uses different commodities for different sub-periods (in which case it is not measuring the same thing at all times). In either case, price changes are so closely associated with output changes that weight bias is necessarily a factor so important that no index is unambiguously meaningful.[3]

My approach was the latter. Suppose that the sub-index for each component period shows the growth of industries which were 'representative' (in a Marshallian sense) during that portion of the total period. The total index is then a step toward an index whose commodity composition would change from year to year, and which would describe the common

[1] My thanks are due to the Purdue Computing Laboratory, and to Mr. David Jonah in particular, for assistance in programming the material in Part II.

[2] Such as Arthur Burns, *Production Trends in the United States since 1870*, National Bureau of Economic Research, New York, 1934. In the light of the discussion in this paper, one might raise the question of whether the retardation Burns found was spread evenly over the period, or whether (as his tables 16, 17, and 45 suggest) it began only about 1910.

[3] I shall follow the example of Gerschenkron, who showed that if U.S. machinery output were priced at 1899 prices, the index of machinery output in 1939 was 555 per cent. of 1899; if 1939 prices were used, the index in 1939 was 70 per cent. of 1899 (Alexander Gerschenkron, *A Dollar Index of Soviet Machinery Output, 1927–28 to 1937*, Santa Monica, California, 1951, p. 37). Like him, I find it interesting to see what can be done with indices.

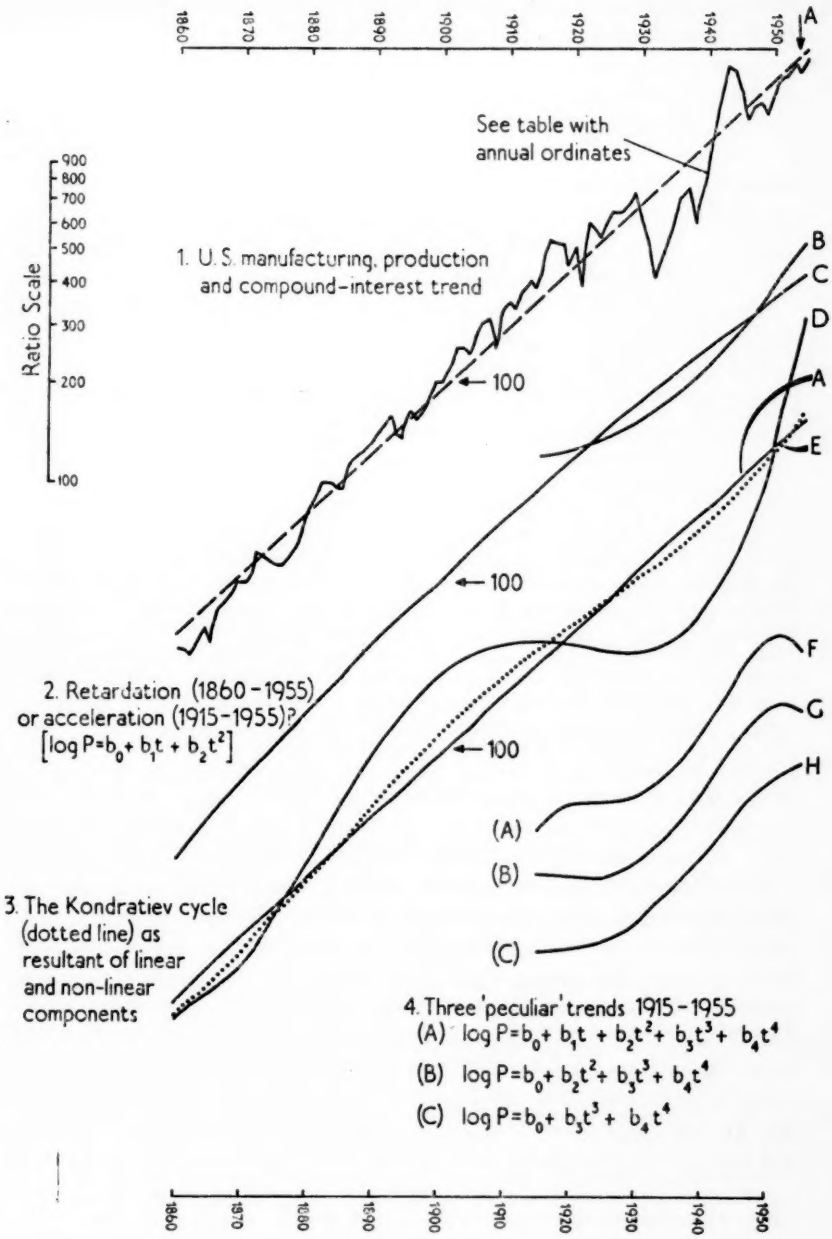
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
A
See table with annual ordinates
Ratio Scale
900
800
700
600
500
400
300
200
100
1. U. S. manufacturing, production and compound-interest trend
B
C
D
A
E
100
100
100
2. Retardation (1860 – 1955) or acceleration (1915 – 1955)? [log P = b0 + b1t + b2t2]
F
G
H
(A)
(B)
(C)
3. The Kondratiev cycle (dotted line) as resultant of linear and non-linear components
4. Three 'peculiar' trends 1915 – 1955
(A) log P = b0 + b1t + b2t2 + b3t3 + b4t4
(B) log P = b0 + b2t2 + b3t3 + b4t4
(C) log P = b0 + b3t3 + b4t4

CHART 1

behaviour of 'representative industries', in general, without regard for their specific technological or social characteristics.[1]

TABLE I

Manufacturing output in the United States, 1860–1955

(1899 = 100)

	Decade									
Year	*1860*	*1870*	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*	*1940*	*1950*
0	16	25	42	71	100	173	249	320	438	753
1	16	26	46	73	111	166	199	269	584	806
2	15	31	49	79	127	190	302	203	737	833
3	17	30	50	70	126	204	288	234	897	906
4	18	29	47	68	121	191	273	259	876	846
5	17	28	47	81	140	224	306	309	744	939
6	21	28	57	74	152	266	325	363	616	
7	22	30	60	80	156	264	326	387	675	
8	23	32	62	91	127	261	341	303	688	
9	25	36	66	100	166	228	374	384	636	

Sources: For 1860–1909, Frickey's Index of Production for Manufacture (Edwin Frickey, *Production in the United States, 1860–1914*, Cambridge, Mass., 1947, p. 54). For 1910–39, Fabricant's series on manufacturing output (reprinted in *Historical Statistics of the United States, 1789–1945*, Washington, D.C., 1949, col. I–13, from Solomon Fabricant, *The Output of Manufacturing Industries, 1899–1937*, New York, 1940, table 1, p. 44; and, by the same author, *Employment in Manufacturing, 1899–1939*, New York, 1942, p. 331). This series was adjusted to give the same average index for 1910–14 as Frickey's index for this same period. For 1940–55, Federal Reserve Indices were used, the index using 1935–9 weights being used for the period 1940–6, and the index using 1947–9 weights being used for the period 1947–55. The indices were adjusted so as to yield the same averages, respectively, for the years 1935–9 and 1947–9, as the indices which they superseded.

II. Rates of Growth and Retardation

Over the period from 1860 until 1914 the rate of growth of manufacturing production was 4·7 per cent. per year; from 1915 through 1955 the rate of growth was 3·8 per cent. per year.[2] A second-degree parabola ($\log P = b_0+b_1 t+b_2 t^2$) indicates a slight retardation ($b_2 = -0{\cdot}0444\times 10^{-3}$). If output growth were really slowing down, the variance about this second-degree function should be less than the variance about compound interest functions ($\log P = b_0+b_1 t$) fitted to the pre-1914 and post-1914 periods separately. Actually it is not (Table II). Moreover, a consistent retardation should certainly show up in the second part of the period, and probably in the first. A logarithmic parabola fitted to the pre-1914 period does show

[1] This concept of 'own rate of growth' is suggested by Gregory Grossman's article on National Income in *Soviet Economic Growth* (Abram Bergson, ed., New York, 1953).

[2] These rates are obtained from regression functions of the form $\log P = b_0+\sum b_i t_i$ fitted to the periods in question.

some retardation ($b_2 = -0{\cdot}0127 \times 10^{-3}$), but since 1914 there has been acceleration in the rate of growth ($b_2 = 0{\cdot}0342 \times 10^{-2}$).

These findings suggest more complicated trends in manufacturing production than some simple constant retardation factor over the entire period There are, however, grounds for accepting a compound interest growth function without more ado.

The compound interest function ($\log P = b_0 + b_1 t$) fitted for the entire period, accounts for 97·7 per cent. of the original variance. A fourth-degree function ($\log P = b_0 + b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4$) accounts for 98·3 per cent. of the original variance. But the data are perhaps not precise enough to justify this refinement; a fourth-degree function may not be intelligible enough to be of scientific use; and even if it were, a reduction of 0·6 per cent. in the variance is too small to warrant the adding of three more terms to the trend function.[1] It might seem that if Arthur Burns found retardation over the period 1870–1929,[2] it was only because he was studying too short a period for the basic linearity of the trend to be quite clear.

III. The Kondratief Cycle

The foregoing discussion makes sense if 'trend' is a purely descriptive number, answering questions such as these: (1) What was the average rate of growth? (2) What was the average rate of retardation or acceleration? (3) How rapidly is the rate of retardation (acceleration) changing? and so on. With adjustments for changes in the number of degrees of freedom, one can also ask how much better an explanation is which includes retardation (or a steadily changing retardation, &c.) than is one which excludes the possibility.

A statistical operation such as trend-fitting involves calculating trend regression coefficients and residual variances. It also requires examination of the individual deviations of observations about the trend line. If years known to have been prosperous are below the trend values, on some trend calculation, then there may be reason to withhold approval of the trend, however well it may fit on least-square criterion.[3]

[1] Almost all trend functions fit well. Of the forty-five trends in powers of t, only three fail to account for 70 per cent. of the original variance, and only seven fail to account for 80 per cent. The fourth-degree function fitted to the entire period leaves 1·7 per cent. of the variance unexplained; 8·4 per cent. can be explained by the function $\log P = b_0 + b_1 t$ and not by a function containing only terms in t^2, t^3, and t^4; a function in terms of t^2, t^3, t^4 explains 0·6 per cent. of the variance not explainable by the term in t; but 89·3 per cent. of the variance can be explained equally well by either a compound interest function or by the function $\log P = b_0 + b_2 t^2 + b_3 t^3 + b_4 t^4$. The principle of Occam's razor suggests the compound interest function.

[2] Burns, op. cit., chap. 4.

[3] Thus a fourth-degree trend function fitted to the manufacturing index for 1860–1914 alters only the fourth significant figure of the coefficient of determination obtained by fitting a linear trend. However, it passes above known business cycle troughs and below known peaks in twenty-one out of the twenty-eight recorded for this period by the National Bureau, whereas the latter does so in only seventeen cases.

The period before 1914 shows a higher rate of growth plus retardation; the period since then a lower rate plus acceleration. Suppose that secular forces do not proceed smoothly over time, even though in a sufficiently long interval they may be summarized by a compound interest function. Then periods of rapid expansion (say 1860–1914) or (1940–55) may be followed by periods of slower growth (say 1915–40). Compound interest functions fitted to the shorter periods will naturally show differing rates of growth.

If the speeding up and slowing down of this 'trend' is periodic over say 60- to 80-year intervals, we have a 'Kondratief Cycle' of some sort: 1860–1914 was, perhaps, a Kondratief up-swing; the period since then was at first a Kondratief down-swing and, more recently, a new up-swing. On this assumption, Chart 2 shows the shape of this 'long cycle'. A function of a peculiar sort ($\log P = b_0+b_2 t^2+b_3 t^3+b_4 t^4$) was fitted to the entire period because it maximizes non-linear, 'cyclical' influences of a long-term sort. This particular trend, which we can reject on other grounds, has the virtue of showing this clearly marked 'long cycle'. When linear terms are admitted into the function ($\log P = b_0+b_1 t+b_2 t^2+b_3 t^3+b_4 t^4$) the amplitude of these fluctuations, of course, is greatly reduced, although their influence is apparent.

Thus the decrease in average rates of growth accompanied by an increase in acceleration when we compare the pre-1914 with the post-1914 data is explainable either by a 'fluctuating trend',[1] or a 'Kondratief cycle'. If the 'Kondratief cycle' is approximated by the fourth-degree power function used here, however, it provides us with only two troughs (1867 and 1942) and one peak (1904).

IV. Stagnation in the Interwar Period

Another extremely simple hypothesis can serve to explain the curious fact that for the period 1860–1955 there is an apparent retardation; whereas for the more recent period 1915–55 there is an apparent acceleration in the rate of growth.

For the period 1860–1914 let us assume a linear trend.[2] For the period since 1914 the coefficient of determination of a linear trend is only 0·790,

[1] B. Weber and S. J. Handfield-Jones, 'Variations in the Rate of Economic Growth in the U.S.A., 1869–1939', *Oxford Economic Papers*, 1954, pp. 101 ff., agree that there was no retardation. On the other hand, they found a recurrent fluctuation in growth rates, averaging about 25 years in length (p. 107) which is not detected by the methods used here.

[2] A fourth-degree function for this period does not increase the third figure of the coefficient of determination, so that less than one-tenth of 1 per cent. of the total variance is accounted for by terms in t^2, t^3, and t^4. Moreover, the straight-line trend fitted to the entire period gives almost as good a fit for 1860–1914 as the straight-line trend fitted to the sub-period. Of the total residual variance about the straight-line trend fitted to the period 1860–1955, more than five-sixths occurs in the period after 1914.

compared to 0·989 for a linear trend over 1860–1914. Even adding terms in t^2, t^3, and t^4 raises the coefficient only to 0·863.

Curiously enough, however, functions containing terms in t give lower coefficients of determination than those with an equal number of terms but not including t. For example, the function $\log P = b_0 + b_3 t^3 + b_4 t^4$ fits the data better than any other combination of powers up to the fourth. And all of the functions $\log P = b_0 + b_1 t + b_i t^i$ ($i = 2, 3, 4$) fit worse than functions in which the term $b_1 t$ is replaced by a term in a higher power of t.

TABLE II

*Residual variance about trend lines by periods under various hypotheses**

Hypothesis	*1860–1914*	*1915–55*			*1860–1955*
		Total	*1915–34*	*1935–55*	
Compound interest curve, fitted to entire period	7,935	51,870	26,062	25,808	59,805
Logarithmic parabola, fitted to entire period	7,655	42,573	23,544	19,029	50,228
Two compound interest curves, fitted to pre-1914 and post-1914 periods	7,786	40,487	22,002	18,485	48,273
Kondratief hypothesis†	7,213	37,577	18,848	18,729	44,790
Hypothesis C	7,786	30,943	14,886	16,057	38,729
Hypothesis B	7,786	30,202	14,145	16,057	37,988
Hypothesis A	7,786	25,640	9,583	16,057	33,426

* These figures should be multiplied by 10^{-5}. The total variance of the logarithms is $615{,}574 \times 10^{-5}$ for 1860–1914; $192{,}321 \times 10^{-5}$ for 1915–55; and $2{,}587{,}359 \times 10^{-5}$ for 1860–1955.

† The function $\log P = b_0 + b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4$ is here fitted to the entire period. Fitted just to 1860–1914, it leaves a residual variance of $6{,}758 \times 10^{-5}$; fitted just to 1915–55 it yields a residual variance of $26{,}587 \times 10^{-5}$.

Graphical analysis shows that the 'peculiar trends'—those without a term in t—are level or even declining in the early period (say 1915–30), and rise very steeply thereafter. Several of these are reproduced in the Chart.

Formulated more precisely, these trends suggest that manufacturing production rose during the latter, but not the earlier, part of the period. To use traditional terminology, manufacturing industry was 'stagnant' from 1915 until some time in the 1930's, and 'developing' thereafter. On this hypothesis, for the first part of the second period (1915–34) the trend was set equal to the average level of the logarithms of the index over these years. I then averaged the logarithms of the index for 1946–55, placed this value at the centre of the period, and computed the trend forward to 1955 and backward to 1935 on the assumption that a 'developing' industry

could grow at the same rate (4·7 per cent. per year) as it had before the First World War. This hypothesis is not only more intelligible, but it fits better than the fourth-degree function $\log Y = b_0+b_1 t+b_2 t^2+b_3 t^3+b_4 t^4$; while its residual variance is only 55 per cent. of that about the compound interest trend fitted to the entire period (Hypothesis A, Table II).

This hypothesis, of course, has certain objectionable features. The trend value for 1914 is $\log 191 = 2{\cdot}2810$, that for 1915 is $\log 272 = 2{\cdot}4342$. The trend value for 1934 is $\log 272 = 2{\cdot}4342$, that for 1935 is $\log 368 = 2{\cdot}5661$. And the slope of the trend line for 1935–56 is not fitted by least-squares methods. The hypothesis accounts for 98·7 per cent. of the total variance for the period 1860–1955, as compared to 98·3 per cent. under the Kondratief hypothesis, and 97·7 under a single compound interest trend fitted to the entire period.

As an alternative, instead of a completely stagnant trend line from 1915 to 1934 we join the 1914 and the 1935 trend values with a straight-line trend in the logarithms, so that there is one high rate of growth for 1860–1914 and for 1935–56, and one low rate for 1915–34. This hypothesis (Hypothesis B in Table II) fits better than the Kondratief hypothesis, but worse than Hypothesis A.

Finally, the period from 1915 through 1929 may have been basically a continuation of the pre-1914 period, but 1929 marked a basic discontinuity in the economy. If we extrapolate forward to 1929 the compound interest trend for 1860–1914; and extrapolate backward to 1930 the trend already used for 1935–55, we obtain results (Hypothesis C in Table II) almost as good as Hypothesis B and therefore better than the Kondratief hypothesis, but worse than Hypothesis A.[1]

V. The Logistic Trend

The logistic curve, represented by the function $P = [a+bc^t]^{-1}$ has been used by some economists to represent output trends. It is S-shaped rising from one asymptote of zero at an increasing rate until P has the value $a^{-1}/2$; growth then retards until finally an upper asymptote of a^{-1} is reached as $t\to\infty$. The basic methods of fitting it[2] do not determine uniquely the exact position of the trend—and in this case they yield somewhat differing results. Findings must therefore be stated rather cautiously. In particular, the 'coefficient of determination', measuring the percentage of the variance in the original data which has been accounted for by the trend, is not uniquely determinable in a least-squares sense.

[1] Hypothesis A gives a coefficient of determination of 0·867; Hypothesis B 0·843; and Hypothesis C 0·838 over the period 1915–55. By comparison, a compound interest trend gives $R^2 = 0{\cdot}790$, and a fourth-degree function 0·863.

[2] See Harold T. Davis, *The Analysis of Economic Time Series*, Bloomington, Indiana, 1941, pp. 250–3.

For the period 1860–1955 as a whole, the logistic curve explains about 92 per cent. of the variance, whereas the compound interest function explains about 98 per cent. of the variance of the logarithms. Since the most violent fluctuations in the manufacturing index—the 1929 depression and the Second World War—are concentrated at the 'high end' of the series, residual variance of logarithms should be less than that of the data themselves.

TABLE III

Characteristics of logistic trends fitted to various intervals of the index of manufacturing production, 1860–1955

Mid-point of period fitted	*Span of period*	*Indicated inflexion point**		*Percentage of variance explained*
		Production level	*Date*	
1887	1860–1914	3,928	1987	98
1895	1860–1929	741	1951	98
1908	1860–1955	708	1946	92
1935	1915–55	499	1937	76
1942	1930–55	405	1937	79

* The production level (1899 = 100) here is half of the upper asymptote. The dates at which this point would have been reached, assuming the given trend, were in some cases obtained by extrapolation.

Table III shows that the later the mid-point of the period for which logistic curves are fitted, (*a*) the lower the percentage of variance explained by the trend, (*b*) the lower the upper asymptote, and (*c*) the earlier is the 'critical point' at which the slowing down of the rate of growth begins.[1] Since the curve fits well until 1929, either some discontinuity occurred in about that year[2] or else that the use of a different function would dominate the systematic variation represented by the 'shift' in the logistic trend shown in Table III.

If a discontinuity in the trend occurred in 1930, a 'splice' of two trends is possible. This splice explains about one-third of the variance left from a fitting of a single logistic curve for the whole period 1860–1955. Thus 95 per cent. (rather than 92 per cent.) of the variance can be explained on

[1] The error may be in the methods of curve-fitting. It was observed that the Pearl-Reed method, which weights relatively heavily the first third of the period fitted, tends to give good fits in the early period, but low trend values for later years. Davis's method, on the other hand, gives good fit in later years, but low trend values in earlier years. However, Davis warns that no method gives completely reliable results unless the data extend for a 'considerable period' beyond the inflexion point. This is probably not the case here.

[2] Under the logistic hypothesis, a single discontinuity in 1915 may be excluded, since the fit for 1860–1929 is as good as that for 1860–1914; and since the fit for 1930–55 is better than that for 1915–55. Assuming a discontinuity in 1915, 92 per cent. of the variance can be explained, but this result is no better a fit than the fit of a single logistic curve to the entire period.

the assumption that a new logistic trend 'went into operation' in 1930. On the other hand, this trend has its upper limit at 810, while the production index was well above this level in 1943–4 and again in 1952–5. Moreover, on this particular hypothesis, the trend of output was being 'almost stagnant' after the end of the Second World War, and was at its most rapidly growing in the late 1930's. This view may accord with a cyclical analysis, but hardly with a secular analysis.

Algebraic functions in the logarithms suggest that although output has, on the average, risen at a slower rate since 1915 than it did formerly, this rate of growth has been accelerating. The logistic trend, however, suggests that (1) growth increased at an accelerating rate through 1929; (2) there was then a discontinuous change, with a new growth pattern setting in; (3) this growth pattern, by 1955, either had actually reached its upper limit, or was only slightly below it. Algebraic functions of the logarithms will lead one to high, and the use of logistic trends to low, forecasts of output.

VI. Conclusions

1. Algebraic trend functions fitted to the logarithms in general fit the data very closely, and show that:

(*a*) Over a period of almost a century, American manufacturing output has risen at an average rate of 4·4 per cent. per year. No strong evidence of a slowing down in the rate of growth exists; and since 1915 there is evidence of an accelerating rate of growth.

(*b*) There is a little evidence of a 'Kondratief cycle' in manufacturing output, with a trough in 1867, a peak in 1904, and a trough in 1942.

(*c*) However, there is more evidence of a period of stagnation over the period 1915–35. The rest of the period since 1914 can well be summarized in terms of a compound interest rate of growth of 4·7 per cent. per year.

2. The logistic trend function also gives a very good fit to the production index prior to 1929. In contrast to the logarithmic trends, it suggests acceleration in the rate of growth until that time; indeed a single logistic trend fitted to 1860–1955 has the level of expansion accelerating until 1946, with a 'saturation level' roughly 50 per cent. above the 1955 peak. The period since 1914, analysed by logistic trend analysis, shows a new 'cycle of growth', discontinuous with earlier trends, which by 1955 had virtually spent itself. Thus the more recent past, on this analysis, gives less promise of future expansion than it does on the basis of other trend functions. However, logistic functions, particularly since 1929, do not seem to fit the data as closely as the algebraic functions.

3. In any case, the development of manufacturing output seems to have

been interrupted in the first third of the century, and discontinuity in the growth pattern is suggested whichever method of trend analysis is used.

APPENDIX

I. Computation of Regression Equations of the Form $\log P = b_0 + \sum_i b_i t^i$

Appendix Table I shows the results of computing trends of the form

$$\log P = b_0 + \sum_i b_i t^i.$$

A total of fifteen such functions were fitted for the periods 1860–1914, 1915–55, and 1860–1955. These functions took all combinations of i for i equals 1, 2, 3, 4. In this calculation, which was performed on the digital computer of the Purdue Computing Laboratory, values of the coefficient of determination (R^2), and the residuals of the data about each trend line were computed.[1]

In addition, the following data were obtained: (1) whenever the sign of the residual about the trend changed (i.e. the data crossed the trend line), this was taken as indication of an upward or downward cyclical movement. One-half the total number of sign changes then equals the number of 'residual cycles'. (2) The average length of 'residual cycles' was computed.[2] (3) A 'reference cycle pattern' was prepared from National Bureau timing of reference cycle peaks and troughs. In the period following a reference cycle trough up to and including a reference cycle peak, the index could be expected to be increasing; following a reference cycle peak up to and including the following trough, the index could be expected to be declining. Agreement of the signs of first differences of residuals about trend with the reference cycle pattern was measured. (4) If the entire economic process consists of a trend and of a short-term movement with the timing exhibited by the reference cycle, reference cycle peak years should be above trends, and reference cycle trough years should be below. For each trend calculation, the number of cases in which production in reference cycle peak and trough years 'straddled' the trend lines in this way.

II. The Length of the Business Cycle as a Criterion in Trend-fitting

Some economists distinguish cyclical from secular influences and there has been discussion of whether there are several orders of cycle. If the secular movement of production is relatively smooth, and if there is a single cycle in the economy, business-cycle peaks would in general be *above* and troughs *below* trend values. Moreover, if a correct method of trend-fitting has been used, the index should cross the trend line twice in every full cycle. If neither of these expectations is fulfilled, either the concept of a 'smooth' secular trend over a long period should be abandoned, or the concept of higher-order cycles should be accepted.

The method of counting cycles described above may overestimate the number (underestimate the length) of 'residual cycles,' since every minor bobble about the trend line is treated as a 'cycle'. It will not, however, underestimate the number (overestimate the length). For none of the logarithmic trends fitted does the average length of these cycles fall below 6·5 years; in contrast, the average length of the National Bureau's 'reference cycle' is less than 3 years.[3]

[1] A tabulation of the regression coefficients for these functions is available from the writer on request. So also are the constants obtained from fitting the logistic curve under the various assumptions as to discontinuity described in the text.

[2] E. M. Frickey, *Economic Fluctuation in the United States, 1860–1914*, Cambridge, Massachusetts, 1942, pp. 44–45, shows the effect of changing the function fitted upon the length of residual cycles in pig-iron production.

[3] The variations in the length of the 'residual cycles' are consistent with Frickey's findings in the pig-iron case. In the extreme examples, where less than two cycles appear

[*continued on p. 281*]

Function number	*Function fitted: log P equals*	A. *Coefficient of determination*			B. *Number of residual cycles**			C. *Average length of residual cycles (year)†*			D. *Turning-point straddling‡*		
		1860–1914	*1915–55*	*1860–1955*	*1860–1914*	*1915–55*	*1860–1955*	*1860–1914*	*1915–55*	*1860–1955*	*1860–1914*	*1915–55*	*1860–1915*
I	$b_0+b_1t+b_2t^2+b_3t^3+b_4t^4$	0·989	0·863	0·983	8·5	5·0	12·5	6·5	8·2	7·7	50	47	45
II	$b_0+b_2t^2+b_3t^3+b_4t^4$	0·986	0·854	0·899	8·0	4·5	4·5	6·9	10·3	21·3	36	37	11
III	$b_0+b_1t+b_3t^3+b_4t^4$	0·989	0·851	0·980	8·5	4·0	11·5	6·5	10·3	8·3	36	47	45
IV	$b_0+b_1t+b_2t^2+b_4t^4$	0·989	0·844	0·981	8·5	4·0	13·0	6·5	10·3	7·4	50	47	53
V	$b_0+b_1t+b_2t^2+b_3t^3$	0·989	0·840	0·981	8·5	4·5	14·0	6·5	9·1	6·9	50	47	49
VI	$b_0+b_1t+b_2t^2$	0·989	0·830	0·981	8·5	2·5	14·0	6·5	16·4	6·9	50	26	49
VII	$b_0+b_1t+b_3t^3$	0·989	0·822	0·980	8·5	3·5	10·5	6·5	11·4	9·1	50	37	34
VIII	$b_0+b_1t+b_4t^4$	0·989	0·814	0·980	8·5	5·5	13·0	6·5	7·5	7·4	50	47	36
IX	$b_0+b_2t^2+b_3t^3$	0·980	0·832	0·834	5·0	4·5	2·5	11·0	9·1	38·4	21	37	2
X	$b_0+b_2t^2+b_4t^4$	0·973	0·835	0·329	5·0	5·5	1·0	11·0	7·5	96·0	14	47	2
XI	$b_0+b_3t^3+b_4t^4$	0·950	0·848	0·866	5·0	5·0	1·5	11·0	8·2	64·0	29	58	6
XII	b_0+b_1t	0·989	0·790	0·977	8·5	5·0	8·0	6·5	8·2	12·0	21	47	23
XIII	$b_0+b_2t^2$	0·929	0·828	0·261	2·0	3·0	3·5	28·0	13·7	27·4	7	5	15
XIV	$b_0+b_3t^3$	0·834	0·786	0·819	1·0	5·0	1·0	55·0	8·2	96·0	0	26	2
XV	$b_0+b_4t^4$	0·745	0·721	0·322	1·0	5·0	2·0	55·0	8·2	48·0	0	26	6

* One residual cycle has been counted for every two sign changes in the residuals.

† The number of years in the period divided by the number of residual cycles.

‡ The number of cases in which the observations were *above* trend in years of reference cycle peaks and *below* trend in years of reference cycle troughs. There were 28 reference cycle turning-points in 1860–1914; 19 in 1915–55; a total of 47. These figures, computed from the formula $s-f/s$, where s = number of cases counted by the above rule, t = total number of turning-points, $f = t-s$, measures in National Bureau usage, the extent to which the results differ from the results which would be obtained by chance. Complete 'straddling' would result in a coefficient of 100 (every peak would be above, and every trough would be below, the trend); while complete absence of straddling would result in a coefficient of 0.

Secondly, a test comparable to those made by Mitchell and by Burns and Mitchell was made: the number of reference cycle turning-points straddling the trend line[1] minus those not straddling the trend was expressed as a percentage of all turning-points in the period. This percentage would be taken as the probability that chance factors alone could have accounted for the failure of all turning-points to straddle. This probability is not strong. The failure to straddle may equally well be ascribed to non-chance factors, including in particular the hypotheses (which may well be equivalent) that the true trend is not as smooth as has here been assumed or that there is a cycle of longer duration than the reference cycle.

over the period under study, it is not hard to reach the conclusion that a 'bad trend' is being used.

[1] A reference cycle peak which is above the trend, or a reference cycle trough which is below the trend, 'straddles' the trend in this argument.

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ECONOMIES OF SCALE IN ROAD GOODS TRANSPORT? OFF-FARM MILK COLLECTION IN ENGLAND AND WALES

By MICHAEL CHISHOLM

PROFESSOR GILBERT WALKER has affirmed that there are economies of scale in road transport operations.[1] He has also pointed out the extreme difficulty of obtaining sufficient data upon which to base analysis and judgement, and this is doubtless the reason why few attempts have been made to measure the economies which may be associated with increases in the size of road transport firms. Those studies which have been published mostly lead to the conclusion that there are no apparent economies associated with a greater scale of operations. For example, M. J. Roberts found that size of firm is not a factor affecting the costs of operations of 114 class I carriers in the U.S.A.,[2] and a like conclusion was obtained by L. J. Cadbury for a sample of vehicles in Britain in the mid-1930's.[3] Similarly, over a wide range of operations no economies pertain to larger firms in New South Wales, Australia.[4] Finally, E. W. Smykay,[5] in examining some of the recent American literature, including Roberts's article, concluded that the evidence as to whether or not scale economies exist is so scanty that a great deal of further work remains to be done.

The present study is a contribution towards filling the gap in statistical evidence, showing that there are no scale economies in the business of milk collection from farms in England and Wales, and that there are even some slight dis-economies. It appears that the main possible source of economies in transport operations may well be the business of organizing return loads and making up full consignments, and that no economies exist in the other aspects of the business. If this is in fact the case, it is of the utmost importance for policy relating to the organization of the road haulage industry, since all that is required for efficient operations is the provision of clearing-house facilities. On economic grounds there is no particular reason why such a clearing-house should be a private venture selling its services to individual operators, a co-operative organization, or

[1] G. Walker, *Road and Rail* (1942), pp. 166–9.

[2] M. J. Roberts, 'Some Aspects of Motor Carrier Costs: Firm Size, Efficiency, and Financial Health', *Land Economics*, 1956, pp. 228–38.

[3] L. J. Cadbury, 'Large and Small Firm: a Note on Costs in the Road Transport Industry', *Economic Journal*, 1935, pp. 789–93.

[4] H. Kolsen, 'Structure and Price Determination in the New South Wales Road Haulage Industry', *Economic Record*, 1956, pp. 291–304.

[5] E. W. Smykay, 'An Appraisal of the Economics of Scale in the Motor Carrier Industry', *Land Economics*, 1958, pp. 143–8.

State enterprise forming part of a nationalized road service. The choice is primarily dependent upon a value judgement.

However, some of the evidence for the absence of economies of scale is inconclusive. In the above-mentioned studies, economies are not apparent, but this does not mean they are non-existent; they may be hidden or counterbalanced by other factors. Therefore, to be conclusive, evidence must be brought forward which will explain much or all of the

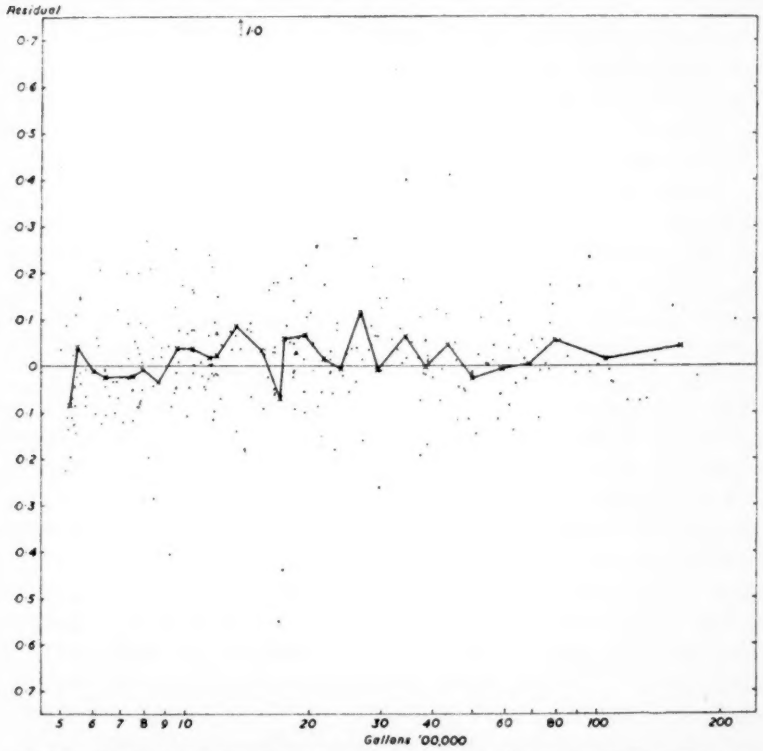

FIG. 1. Residual variation in unit cost, pence per gallon, against the gallonage collected annually by the contractor. Semi-logarithmic scale. x represents the arithmetical average of groups of ten numbering from the left.

observed cost variations in terms other than those of scale, as only in this fashion can one be certain that the effects of scale are not being masked by other variables. Furthermore, it is necessary to know whether or not the cost function remains constant as scale changes, and whether firms of different sizes occupy more or less favourable points on the function if it does remain constant. In this paper, we are able to present just such material.

The operations of 384 contractors handling roughly half the milk moving off farms in England and W[illegible]les have been analysed in another paper.[1] By dividing the contractors in[illegible]three groups on the basis of the annual gallonage collected, it was found that the variations in unit costs[2] in each group could be 'explained' very well by this general regression formula:

$$\log(Y-0{\cdot}4) = K+A \log X_1+B \log X_2+C \log X_3,$$

where

Y = cost per gallon of milk, in pence,
X_1 = gallons of milk collected per vehicle mile,
X_2 = gallons of milk collected per farm,
X_3 = number of vehicles as percentage of that expected on the basis of the annual mileage run,
K = constant.

The factors A and B are both minus quantities. The results of this analysis are shown in Table I, from which it is clear that a strong inverse relationship exists between unit costs and the quantity of milk collected per vehicle mile, with the amount obtained from each farm a factor of lesser importance. The magnitudes of R^2 show that a large portion of the variation in $\log(Y-0{\cdot}4)$ is 'explained' by the selected variables.

This is the point from which we shall begin our inquiry into economies of scale, but, before proceeding, a few words need to be said on the nature of milk transport. The data refer to contractors collecting milk from farms and transporting it to the 'country' depots. The work is regular throughout the week and year, there is no necessity to solicit custom, the routes are relatively stable, and there is no problem of return loads since these are made up of empty churns being taken back to the farms. Only one commodity, milk, is being handled and in containers of a standard size.[3] Therefore, there are a number of features which distinguish milk collection from other transport enterprises, and the scope for economies of scale is more limited than for other types of transport operation, but is also more closely defined. The possible fields for economy are:

(i) Better adjustment between loads and capacity.
(ii) The use of larger vehicles.
(iii) Repairs and maintenance.
(iv) Administrative overheads.

The Milk Marketing Board have stated that the vehicles are usually fully

[1] Michael Chisholm, 'Regional Variations in Road Transport Costs: Milk Collection from Farms in England and Wales', *Farm Economist*, vol. viii, nos. 11 and 12, 1957, pp. 30–38.

[2] Cost refers to the payment made by the Milk Marketing Board, and therefore includes an element of profit, that which goes to the contractor.

[3] The data refer to the pre-petrol rationing situation of 1955–6.

loaded, so that there is little question of economies from better use of capacity.

The criterion of scale which has been adopted is the quantity of milk collected annually by the contractors. This ranges from about 10,000 to over 20,000,000 gallons a year in the original sample.

TABLE I

*Regression coefficients**

Size-group of contractors, gallons p.a.	*Regression coefficient and standard error*	*K*	*log X_1*	*log X_2*	*log X_3*	
		Constant	*Gallons per vehicle mile*	*Gallons per farm*	*Deviations no. of vehicles*	R^2
2,000,001 and over	Reg. coeff.	+1·438	−1·406	−0·241	+0·519	0·860
	S.E.	0·546	0·150	0·086	0·247	
500,001–2,000,000	Reg. coeff.	+2·389	−1·407	−0·218	—	0·842
	S.E.	0·342	0·111	0·084	—	
500,000 and less	Reg. coeff.	+0·479	−0·703	—	—	0·748
	S.E.	0·166	0·120	—	—	

* Factors not significant at the 95 per cent. level of probability have been omitted.

Table I shows that those contractors collecting less than 0·5 million gallons a year have a cost function markedly different from those handling greater quantities. This is because the smaller operators, who are running only one vehicle, generally do additional contract work, and the owner is usually both driver and mechanic. Their costs are therefore much affected by extraneous factors, and they have consequently been omitted from this study, leaving 285 operators. A first reading of Table I might suggest that when these contractors are divided into two size-categories (0·5–2 million and over 2 million gallons collected annually), scale economies are apparent. This would appear to be the case owing to the smaller value of the constant K in the case of the larger operators. However, the estimating equation for the larger firms contains a positive factor (+0·519), multiplying $\log X_3$, which compensates for the smaller value of K. If one uses the equations in Table I to estimate the per gallon costs of collection at various values of gallonage per vehicle mile and per farm (respectively X_1 and X_2), the difference is negligible. A further proof of the similarity of the cost functions is given by combining the data for the two size-groups, to obtain this regression equation:

$$\log(Y-0{\cdot}4) = \underset{}{2{\cdot}286} - \underset{(0{\cdot}326)}{1{\cdot}317}\ \log X_1 - \underset{(0{\cdot}090)}{0{\cdot}242}\ \log X_2 + \underset{(0{\cdot}061)}{0{\cdot}040}\ \log X_3 \quad \underset{(0{\cdot}126)}{} \quad \text{(i)}$$

The standard errors are shown in brackets, and the notation is the same

as on page 284. The $\log X_3$ variable is not signficant at the 95 per cent. level of probability, and has therefore been dropped to obtain this equation:

$$\log(Y-0{\cdot}4) = \underset{(0{\cdot}234)}{2{\cdot}358} - \underset{(0{\cdot}074)}{1{\cdot}301}\log X_1 - \underset{(0{\cdot}060)}{0{\cdot}246}\log X_2$$

Equation (ii) gives a value of 0·845 for R^2. The fact that the same form of regression gives a value of R^2 comparable to the values shown in Table I indicates that there is no great change in the shape of the cost function as scale varies. Since the form of the regression is similar over the whole range of firm size, economies (or dis-economies) of scale can only arise if enterprises of different sizes occupy different positions on the cost hyper-surface, or as a factor affecting the residual variations.

TABLE II

Average values for size-groups of contractors

Size-group, million gallons of milk	*Average size, million gallons of milk*	*Cost per gallon, pence*	*Gallons per vehicle mile*	*Gallons per farm, '000*	*Gallons per vehicle, '000*	*Miles run per vehicle, '000*
0·50–0·75	0·605	0·815	21·7	11·2	427	19·6
0·75–1·50	1·040	0·883	20·1	11·7	425	21·1
1·50–3·00	2·159	0·971	18·7	10·3	396	21·2
3·00–6·00	4·307	0·909	19·8	10·4	426	21·6
6·00–12·00	8·068	0·833	21·9	11·6	454	20·8
12·00 and over	15·441	1·049	17·5	8·2	413	23·6

To investigate the former possibility, the contractors have been grouped according to the scale of operations, and certain average values computed for each group. Table II indicates that the total quantity of milk collected per vehicle remains roughly constant over the size-range analysed, but that there is a slight tendency for the aggregate annual mileage of each vehicle to increase as the contractors become larger, with a consequent decline in the quantity of milk collected per vehicle mile. There is also a slight tendency for the bigger operators to obtain less milk from each farm. As equation (ii) shows, reduction in the quantity of milk collected per vehicle mile raises the unit costs of collection, and, likewise, a smaller amount obtained from each farm. This tendency is clearly visible in Table II. Thus, the larger firms have somewhat worse operating conditions, and consequently occupy less advantageous positions on the cost hyper-surface.

Some of these relationships can be expressed more precisely by the regression equations displayed in Table III. Since logarithms have been

employed, a few words on their interpretation will be in place. Taking the second equation as an example, it might be thought that as A increases C would increase more rapidly owing to the spreading of the constant ($-5{\cdot}644$) over a greater number. But in fact a given change in $\log A - 5{\cdot}644$ is matched by an equal change in $\log C$, and an equal change in the logarithms means an equal percentage variation in both A and C. Therefore, in this case, the ratio of A/C (gallons per vehicle) remains constant.

TABLE III

Regression equations

		R^2
1. Equation	$\log B = 1{\cdot}028 \log A - 1{\cdot}528$	0·825
Standard error	0·027 0·172	
2. Equation	$\log C = 1{\cdot}000 \log A - 5{\cdot}644$	0·911
Standard error	0·019 0·117	
3. Equation	$\log B = 4{\cdot}291 + 1{\cdot}011 \log C$	0·874
Standard error	0·017 0·023	
4. Equation	$\log D = 1{\cdot}034 \log A - 4{\cdot}303$	0·991
Standard error	0·033 0·210	

A = annual gallonage of milk.
B = annual vehicle mileage.
C = number of vehicles run.
D = number of farms supplying contractor.

In the other equations, the factors are greater than unity, and therefore the dependent variable increases more rapidly than the independent variable. Secondly, it may be thought that the second equation does not tally with Table II, in that the equation gives an average of 441,000 gallons per vehicle per annum, whereas Table II suggests that the average is less. The overall mean is 427,000 gallons per vehicle. This difference of 3·2 per cent. arises from the fact that the regression equation minimizes the squares of the deviations of the logarithms, which is not the same thing as minimizing the squares of the deviations of the natural values. The effect of some large deviations below the estimating equation has been reduced by the use of logarithms, but they have their full impact upon the arithmetic mean.

The first equation of Table III shows that as the quantity of milk collected increases, the annual vehicle mileage increases slightly faster. Hence, there is a tendency for the gallonage per vehicle mile to fall, which is reflected in Table II. On the other hand, equation 2 indicates that the total quantity obtained per vehicle remains constant. This is consistent

with the first equation because, as the third one demonstrates, the aggregate mileage run by each vehicle increases a little with the larger contractors. The decline in the quantity of milk collected per vehicle mile is a worsening of the operating conditions, and we would expect an increase in the unit costs; this does in fact occur, as Table II demonstrates.

Two explanations are possible for this decline in the quantity of milk collected per vehicle mile. It may be that the larger contractors are situated in areas where less milk is produced per mile of route, and to test this possibility the contractors were divided into five groups of equal numbers according to the scale of operations, and maps were prepared with each contractor located by the depot to which he supplied milk. Using the sixteen areas which have been designated on the basis of average unit costs,[1] it was found that in fact there is some tendency for the larger contractors to be located in regions where the quantity of milk collected per vehicle mile is high:

Areas with average gallons per vehicle mile	*Number of contractors, per cent.*	
	Under 2·3 m. gallons p.a.	*Over 2·3 m. gallons p.a.*
Under 18·5 . . .	36·0	25·9
18·5–21·5 . . .	29·1	40·2
Over 21·5 . . .	34·9	33·9
	100·0	100·0

Therefore, the observed phenomenon must be due to an increase in the amount of unproductive running which results from an enlargement of the collecting area.[2] Beyond a certain size of collecting area, vehicles will have to pass through the territories of other lorries before reaching their own sector, and consequently the vehicle mileage requisite for the collection of a given quantity of milk will tend to rise. This being the case, there is evidently a slight dis-economy resulting from an increase in the scale of a contractor's operations.

Table III also shows that the larger contractors do not employ bigger lorries. This is made apparent by the second equation, which shows that the number of vehicles increases at the same pace as the gallonage collected, and that hence the quantity per vehicle remains constant. This is not surprising, as the narrow country lanes set sharp limits to the size of vehicle that can be used, and prevent the realization of possible economies by the use of larger machines.

The fourth equation in Table III indicates that the number of farms served by a contractor increases more rapidly than the total quantity

[1] Chisholm, loc. cit., map 1.

[2] The territories are so organized that the operations of contractors do not overlap.

of milk obtained: the average supplied by each farm therefore declines as the aggregate handled by the contractor rises. This is not a dis-economy associated with the scale of contractors' operations, but is due to a slight preponderance of large contractors in areas of small dairy farms:

Areas with average gallons per farm	*Number of contractors, per cent.*	
	Under 2·3 m. gallons p.a.	*Over 2·3 m. gallons p.a.*
Under 8,750 . . .	22·1	30·4
8,750–13,500 . .	41·3	41·0
Over 13,500 . . .	36·6	28·6
	100·0	100·0

This may be an accidental rather than a causal relationship. If it is a causal relationship, it implies that the larger contractors are better able to make profits in areas of high operating costs than are the smaller firms, i.e. that they work with smaller profit margins. This means a change in the cost function for which no evidence is available, and would lead one to expect larger contractors to preponderate in areas where the gallonage per vehicle mile is low. We have seen that this is not the case. Alternatively, there may be another factor involved: it is possible that regions with large farms attract a great number of competing haulage concerns, with the result that the average size of firms is reduced, but there is no apparent reason why this should be so.

To summarize thus far, it is evident that though the cost function is similar for all scales of operation, the larger firms tend to occupy slightly less favourable points on the hyper-surface. In part this can be directly attributed to the factor of scale, in that a larger firm has to collect from a greater area, which tends to reduce the quantity obtained per vehicle mile. But the decline in the quantity per farm with an increase in the scale of contractor's operations is probably not directly related to the scale factor.

The other possible economies of scale lie in repairs and maintenance and administrative overheads. Since the regression equation used gives a value 0·845 for R^2 (equation (ii)), the maximum variation in $\log(Y-0{\cdot}4)$ that can be 'explained' by these factors is 15·5 per cent. To examine this matter the residuals have been plotted against the scale of contractors' operations and it will be apparent from the diagram that there is no relationship. Therefore, we can conclude that if there are scale economies in the repair and maintenance of vehicles and in administration they are so small as to be of negligible importance.

In parentheses, it should be observed that much of the residual variation

is likely to arise from the fact that each individual firm is probably at some point on its own cost function that does not coincide with the hyper-surface tangential to the individual cost surfaces, and therefore in part represents an imperfection in the technique used. However, the smallness of the error indicates that where the sample of firms is large the use of such a hyper-surface does not seriously impair analysis.

We have, thus, clear evidence that economies of scale are absent, or of minor importance, in the collection of milk from farms, and that certain dis-economies exist. Some of the particular conclusions apply only to the specific business we have analysed, but some also have a wider application:

(i) The similarity of vehicle size at all scales of operation is primarily due to the road conditions, and is specific to milk collection.

(ii) The absence, or negligible importance, of administrative economies probably arises from the nature of the work, in that there is relatively little organization required.

(iii) The decline in the quantity of milk collected per vehicle mile as firms increase in size is related to the amount of 'dead' running required as the territory served increases in size. The same will be true of any similar service carried on from a single centre, and is an important reason for many transport organizations using subsidiary depots. In the particular case, it raises the issue of the point at which it becomes advantageous to create two depots in place of one.

(iv) The absence, or negligible importance, of economies in repairs and maintenance raises some interesting issues. If there really are no economies of scale in vehicle repair and maintenance in the milk haulage industry, then this conflicts with general experience. On the other hand, it may be that these economies are indirect, operating through longer vehicle life, better fuel consumption, and less frequent breakdowns. In this case, the economies will tend to offset the dis-economies experienced as a result of the greater annual vehicle mileage required for collecting a given quantity of milk, and therefore they will be hidden. And if they are hidden, this means that the dis-economies which have been shown to exist for the larger firms are greater than is apparent.

I am indebted to the Milk Marketing Board for their co-operation. They have, however, no responsibility for the views expressed and the conclusions obtained.

EX ANTE AND *EX POST* PROPENSITY TO CONSUME

By H. NEISSER

THE economic profession will be grateful to Mr. Vandenborre[1] for having clarified the meaning of Aggregate Demand in the 'General Theory' and restored the independent position of the Aggregate Supply Function, which had been wrongly disputed by some readers. However, in discussing the Keynesian consumption function and the saving-investment identity, Mr. Vandenborre considers as the only admissible concepts in this function the so-called *ex ante* concepts of consumption and income respectively. He apparently did not notice that Keynes himself changed over to a different interpretation in the course of his writing. Since Mr. Vandenborre is not the only economist to whom an *ex post* interpretation of the concepts in the consumption function is out of question, it seems worth while to clarify an approach which, in actual fact, is the *prevailing* one in both econometric and theoretical work; and to show that the *ex ante* approach is beset by almost insuperable difficulties.

The concept of Aggregate Demand (D) in the 'General Theory', ch. 3, is, indeed, an *ex ante* concept: 'the proceeds which entrepreneurs *expect* to receive from the employment of N men . . .' (my italics). On the other hand, the income concept in ch. 6 is an *ex post* concept, because income is defined there as equal to the value of current output (not to the expected value), and the chapter starts with an *ex post* description: 'During any period of time an entrepreneur *will have sold* finished output'; likewise (ibid., sec. 2) 'consumption is the value of goods sold to consumers during a period and investment is the current addition to the value of the capital equipment which *has resulted* from the productive activity of the period' (my italics). It is in these *ex post* terms that the famous proof for the identity of aggregate saving and investment, in the sense of being valid in any time period, is given.

The correctness of the proof is not disputed by Mr. Vandenborre. He is satisfied with showing that for an *ex ante* concept of income like D (the market value of output as *expected* at the beginning of the period of observation by the entrepreneurs) and the corresponding concepts of *planned* consumption and saving, the saving-investment equality is not valid except in dynamic equilibrium. This has been known—it is a special case of the general proposition which the Stockholm School stressed in the early

[1] This journal, vol. 10, no. 2.

discussion with Keynes; what many of us have not realized is that Keynes himself persistently vacillated between the *ex ante* and the *ex post* notion of income.

In fact the vacillation persists in ch. 8, which introduces the propensity to consume; there aggregate income is treated as a good approximation to aggregate demand D (first and second paragraph);[1] the *qualitative* distinction between D and Y is overlooked. However, there cannot be any doubt that the *ex post* interpretation eventually prevails; witness the 'logical theory' of the multiplier, which is nothing but a simple algebraical transformation of the identity and not a statement of a causal relation.

We can only guess the reason why Keynes in introducing a behaviour function like the consumption function fell back temporarily on *ex ante* concepts. If we conceive the consumption function as describing the reflections of the consumer at a certain moment, t_0, in budgeting for period t, it seems, indeed, to follow that the function refers to what he *plans* to spend in t, taking into consideration, *inter alia*, what he expects to earn, or to receive, as income. This approach has two components; the one is the functional relation between the schedule of alternative income values conceivably earned in t (or 'disposable', 'available' in period t), and the equally alternative consumption plans; the other component is the particular income value picked out of the whole schedule of alternative incomes as 'most probable' to materialize (or as the mathematical expectation of the probability schedule of incomes) and called 'expected' income.[2] It is clear that to ascertain the consumption function the second component is not required. Even more important: the spending actions of the consumer are not described correctly by the *ex ante* scheme; for information about income earned (*ex post* income) will currently come in, inducing the consumer to *adjust* his spending according to the consumption function.

It is from this angle that we can justify Keynes's *ex post* use of the consumption function. The currently earned income is, indeed, not known to the entrepreneur; for it equals the value which the market *will* bestow at a *future* time on the goods currently in process—at the time when the goods will be sold—minus costs; even for people with contractually fixed income the income expected for a period need not equal the actually earned income nor the income paid out during the period, as Mr. Vandenborre sometimes seems to be inclined to assume. For very short periods it is impossible to build a consumption function with *ex post* income as argument; consumption has to be decided in many cases *before* adequate information is

[1] The relation is via employment N; aggregate demand is a function of N (ch. 3, I), and ncome, in terms of wage units, is considered as determined by N.

[2] The original Swedish attempt (not quite foreign to Vandenborre) to *identify* the schedule with the expected income was already criticized by G. Haberler, *Studies in Income and Wealth*, vol. 2 (1938), p. 158, n. 25.

available about actually earned income; and sometimes when the information is there the funds may not yet be available to spend what one would like to spend from the income earned. But for longer periods the endeavour to adjust consumption to *ex post* income—apart from the influence of other independent variables—cannot but have a high degree of success, since a relatively small part of the nation's consumption is tied up contractually for long periods. This is the 'validity period' of a Keynes model, in which the identity of investment and saving is replaced by an *equation*, in which for actual consumption a function with *ex post* income as argument is substituted. Note that the saving-investment equation still holds identically in time for investment and *actual* saving; but for 'theoretical' saving it holds only over the validity period,[1] and even then only in approximation. Clearly the validity period is not indicative of *equilibrium* in any sense of the terms used. Note further that in Keynes's monetary equation —a stock demand equation—we have to take the average income, the average interest rate, and the average money stock during the validity period to obtain an approximately correct equation for the average transaction, precautionary, and speculative balances; again only an approximation, since even if the balance holding is oriented to the variables mentioned above (e.g. to income and *not* to GNP or to the trading volume), the *ex post* values of these variables are never exactly known during the period, and, surely, only the income which takes the form of a money flow gives rise to balance holdings.

It should be clear that no greater precision than attaching to the theoretical saving quantities can be obtained by putting *ex ante* or expected income into the consumption function as arguments. 'Expected' presumably means expected *at the beginning* of the period for which to plan —but, as we have seen, current experience makes the consumer adjust his expectations and hence his consumption plan. An *ex ante* function would be valid only for a period so short that adjustments are not possible; but for very short periods the consumer does not at all orient his spending to the income which he expects to earn, or to receive, during the very same period. I do not know of any attempt to fit such a function into an overall model of the economic process. The bulk of any econometric work has certainly been directed to ascertain the *ex post* function, from time series or as cross-section analysis of so-called family budgets, i.e. records of *actual* expenditure; the interviews of consumers concerning their spending *plans* have never been developed into a full-fledged consumption function *ex ante*.

[1] This is the correct condition. Vandenborre's condition 'that the proceeds of the employers from their *output* (D_0) will . . . exactly be equal to the money they hand to the factors of production for the services' (ibid., p. 217) is not necessary, and not even sufficient; for even if the employers do so, their actual consumption need not be equal to the theoretical consumption according to the consumption function applied to whatever income.

Nor has in theoretical work, outside the Swedish domain proper, the *ex ante* approach played a role, except as an occasional dodge to beat the inconvenient saving-investment identity, or similar international identities. There has been, of course, since Samuelson in 1939 developed the acceleration-multiplier model in form of a difference equation a vast amount of theorizing in which consumption appears geared to 'yesterday's' income, time-lags being the soil in which difference equations thrive. This is not '*ex ante*' in the strict sense of the word—it still uses *ex post* income though of a different period; hence the saving-investment identity remains valid.[1] The empirical aspects of this approach are still under discussion, and anyway, it plays no role in Mr. Vandenborre's analysis.

NEW SCHOOL, NEW YORK.

[1] By identifying the lagged-income consumption function with the Robertsonian income concept and confusing the corresponding saving concepts (S_t (Hicks) $= Y_t - C(Y_{t-1})$, and S_t (Robertson) $= Y_{t-1} - C_t$), Mr. A. Ll. Wright (*Quarterly Journal of Economics*, Aug. 1958, p. 345) has discovered that the Hicksian model is overdetermined; he retains $I_t = S_t$, although he defines income and saving in Robertsonian terms. Obviously we deal with an inconsistency, not with overdeterminacy.

NOTES ON 'UNBALANCED GROWTH'

By RAGNAR NURKSE

[Ragnar Nurkse died, very suddenly and unexpectedly, on 6 May 1959. During the last days of his life he had been reading a proof of the article 'Unbalanced Growth' by Paul Streeten, which had been sent to him by the author, prior to its appearance in the June issue of *Oxford Economic Papers*. To this it is evident that he was meditating a reply, but no more than a few fragments of it were actually written. These have been put together by the care of Professor James Tobin, who, like Nurkse, was spending a sabbatical year at Geneva. Though they cannot convey very much of what he would have said if his life had been extended, they do perhaps give some idea of the direction in which his mind was moving, and are worth preserving as his last thoughts on an issue with which he had been so much concerned.

One or two explanations should be given. Streeten's criticisms had been mainly directed against the first of the lectures which Nurkse had given at Istanbul in 1957 (*Lectures on Economic Development*, published by the Faculty of Economics, Istanbul, and the Faculty of Political Sciences, Ankara, in that year). There exists, however, a more recent writing by Nurkse (the Wicksell Lectures which he gave in Stockholm in early 1959, published in Stockholm under the title *Patterns of Trade Development*); this, however, did not appear until after Nurkse's death, so that it was not available to Streeten. It does, however, have considerable relevance.

Returning to the Istanbul Lectures, it was Nurkse's view that a good many of the criticisms which Streeten advanced against his first lecture had been answered (or anticipated) in the second. Thus in the second lecture Nurkse had insisted on the importance of anticipatory overhead investment as a condition of economic growth (pp. 22–27) like Streeten on p. 179. (He did not see the footnote which Streeten subsequently added on that page.) It is from this point that his words begin.]

No doubt Streeten thinks I contradict myself in these two pieces, two lectures printed side by side, of which one seems to favour balanced growth, the other unbalanced growth. But each has its special context. My interpretation of the phrase 'balanced growth' is more limited and less rigid than he makes it out to be. Streeten seems to have no use for special contexts and seems anxious to establish a general doctrine favouring unbalanced growth. In this spirit he puts all who ever used the phrase 'balanced growth' in the same camp. He then bombards this enemy camp with heavy cannon. Incidentally, why start with List? An interesting shipload of 'balanced growth' economists could be made up of such diverse figures as Alexander Hamilton, Tench Coxe, Sir J. Steuart, and A. Smith.

The balanced growth notion, as I now tend to use it, is confined to the sphere of directly productive investment, as distinguished from overhead investment.[1] Even in the sphere of direct investment, balanced growth is necessary only if export demand is not 'sufficiently' expanding. With an expanding export demand, direct investment would not need to follow a balanced growth pattern but would take the form of direct investment in

[1] Istanbul Lectures, pp. 28–29.

export production, and the complementarities in the make-up of additional consumption can then be implemented through international trade. This is not possible when the backward countries suffer from an export lag.[1] This export lag is a basic assumption without which balanced growth is untenable or pointless. It is only when 'growth through trade' is not possible that the correspondence, implied in balanced growth, between national output and national consumption pattern is needed. I am sorry that Streeten cites nineteenth-century Britain as a counter-example to balanced growth, for the whole burden of my song is that conditions for the nineteenth-century type of growth through trade are no longer so favourable.

I am now inclined to think that it might be well to distinguish between balanced growth as a method and balanced growth as an outcome or objective. Even zigzag growth must have balance as its ultimate aim, in the sense of output expansion in accordance with national income elasticities of demand. Suppose that a country's exports refuse to expand, while its factor supplies increase and its appetite rises. Production must then expand not for export but for home market demand. What determines the pattern of home market expansion? In the main, national income elasticities of demand. This outcome leaves plenty of room for zigzags in the mechanics of output growth. As regards the mechanics I am inclined to be 'liberal', accepting as alternative possibilities: central planning; generally optimistic expectations leading to spontaneous advance on a wide front; or the 'disequilibrium' method of zigzag growth in successive industries or sections, each tugging the other along by signals given by the price-mechanism. I still think, however, that horizontal maladjustment (to be distinguished from vertical imbalance due to anticipatory overhead investment) is not good for its own sake and slows down growth.

[To this there are two shorter passages from Nurkse's papers which may perhaps be added. The first, from a lecture given at the Institut de Science Économique Appliquée in Paris, on 2 December 1958, elucidates what is said above about income elasticities of demand.]

Shortages in specific factor supplies, among other possible causes, can and will naturally produce changes in relative prices, to which consumer demand will tend to adjust itself. To this extent the output expansion will deviate from the path of income elasticity, which assumes a constancy of relative prices. No one has denied that price-elasticities, too, help to determine a community's pattern of demand. But changes in relative prices have no close or determinate relation to economic growth as such, whereas changes in income are a direct reflection and measure of growth. Hence

[1] See Istanbul Lectures, pp. 6–8. (See also Wicksell Lectures, pt. 1, section 3.)

the prominence given to income elasticities in a macro-economic approach to the problem of international growth economics.

[The other is from a letter to Streeten, of November 1958.]

What I had in mind there[1] was the 'basic contradiction of capitalism' as Marx put it and as Malthus dimly saw it before him, namely, the fact that when the means to invest are there the will may be lacking, and vice versa. A certain level of investment depends upon a certain rate of increase in consumption. From the technical viewpoint of capital theory, the case for socialism is that it cuts the connexion between investment activity and consumption change; all investment becomes autonomous.

[But this must be read in the light of what is said above. (J. R .H.)]

[1] Istanbul Lectures, p. 11.

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